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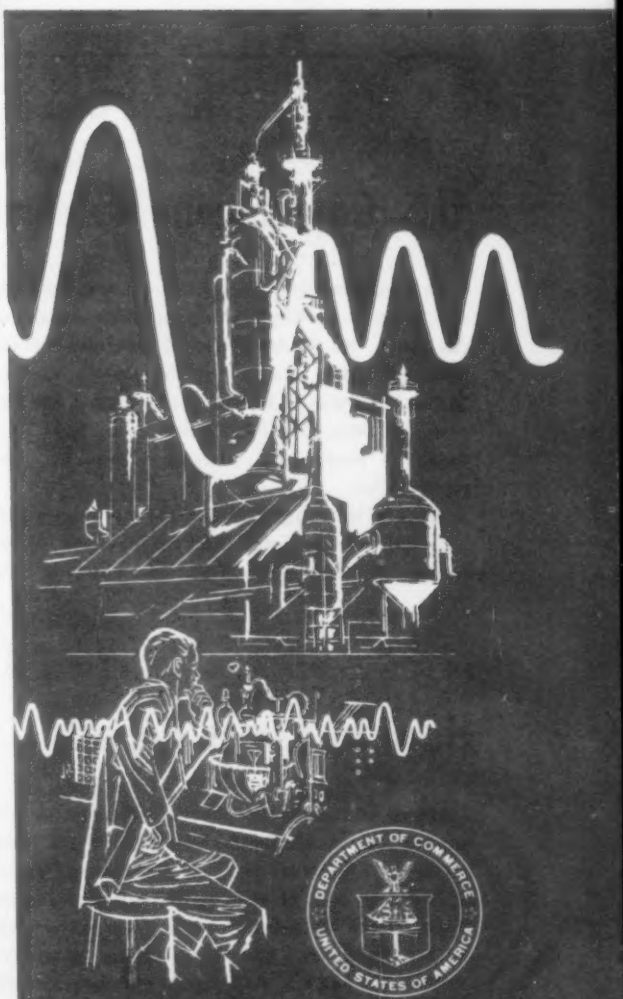

U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

Office of Technical Services
John C. Green, *Director*

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AD-263 900 - 264 699

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-263 985 Div. 1
(TIPSE/NTM) OTS price $7.60

Case Inst. of Tech., Cleveland, Ohio.
AIRCRAFT MAINTENANCE IN A THEATER ARMY (PART I).
Final rept.,
by A. Chamberlain, R. L. Ackoff, and G. D. Camp.
8 Feb 60, 60p. incl. illus. tables.
(Contract DA 44-177-tc-507; In cooperation with Transportation Corps., Washington, D. C.)
Unclassified report

DESCRIPTORS: Aircraft equipment, *Military aircraft. (*Maintenance, Aircraft equipment, Costs.) (Training, Maintenance personnel.)

A method was developed to determine and evaluate an optimum maintenance system for army aircraft in a Theater Army and recommends a specific support plan. (Author)

AD-263 986 Div. 1
(TIPSE/NTM) OTS price $9.10

Case Inst. of Tech., Cleveland, Ohio.
AIRCRAFT MAINTENANCE IN A THEATER ARMY (PART II)
Final rept.,
by A. Chamberlain, R. L. Ackoff, and G. D. Camp.
8 Feb 60, 153p. incl. illus. tables.
(Contract DA 44-177-tc-507; In cooperation with Transportation Corps, Washington, D. C.)
Unclassified report

DESCRIPTORS: (*Maintenance, Aircraft equipment, Costs.) (*Military aircraft, Reconnaissance planes, Helicoptors, Rescues, Maintenance.)

A method was developed to determine and evaluate an optimum maintenance system for army aircraft in a theater army and recommends a specific support plan. (Author)

AD-263 987 Div. 1
(TIPSB/CCH) OTS price $1.60

Case Inst. of Tech., Cleveland, Ohio.
TEST AGENDA FOR CASE AIRCRAFT SUPPORT SYSTEM.
Final rept. on an Operations Research Study.
1960, 17p.
(Contract DA 44-177-tc-507; In cooperation with Transportation Corps, Washington, D. C.)
Unclassified report

DESCRIPTORS: (*Aircraft, Operations research, Ground support equipment.) (*Aviation accidents, Supplies, Maintenance, Maintenance personnel, Logistics, Costs, Probability, Computers.) Tests.

The Case Aircraft Support System, which proposes radical departures from present procedures, appears to be capable of improving aircraft maintenance and reducing the cost of meeting operational requirements by about $40 million per field army year. However, despite all possible effort at realism and practicality, this system is nevertheless an abstraction until tested operationally. A Test Agenda for testing and gradually implementing the Case Aircraft Support System, or such modification of this system as operational experience may suggest, is described. (Author)

AD-264 027 Div. 1
(TIPSE/WAW) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF CONTROL-FEEL CONFIGURATION ON AIRPLANE LONGITUDINAL CONTROL RESPONSE,
by Harold L. Crane and Robert W. Sommer. Oct 61, 33p. incl. illus. tables, 10 refs. (Technical note D-912)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-912.

DESCRIPTORS: (*Jet fighters, Jet planes, Control systems, Control.) (*Control sticks, Human engineering, Flight testing, Mathematical analysis, Effectiveness.)

A control-feel system, which was adjustable in flight, provided control feel as a function of any combination of stick deflection, stick rate, airplane normal acceleration, pitching acceleration, and pitching velocity. The dynamic effects of using varied feel sources in various ratios were measured and/or calculated. Frequency-response plots are presented to illustrate the dynamic effects of feel from the several sources and combinations thereof. The investigation was conducted at a Mach number of 0.85 and an altitude of 28,000 feet. (Author)

AD-264 131 Div. 1
(TIPSE/NTM) OTS price $8.10

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
THE INFLUENCE OF AERODYNAMIC HEATING ON THE STRUCTURAL DESIGN OF HIGH-SPEED AIRCRAFT. PART IX. DEVELOPMENT OF STRUCTURAL DESIGN CRITERIA FOR AIRCRAFT SUBJECTED TO AERODYNAMIC HEATING,
by Warren L. McCabe and John W. Leech. Mar 60, 76p. incl. illus. 24 refs. (Technical rept. no. 73-6)
(Contract NOa(s) 57-690-d)
Unclassified report

DESCRIPTORS: (*Aircraft, *Aerodynamic heating, Design, Airframes, Safety, *Structures.) (Creep, Airframes, Temperature, Thermodynamics, Reliability, Load distribution, Failure (Mechanics).)

The influence of aerodynamic heating on the

structural strength, stiffness and life design of high-speed aircraft is discussed. Critical design conditions are suggested for the strength and stiffness design of airframes experiencing elevated temperatures. Fatigue and creep design specifications are discussed. Safety factor requirements are recommended. (Author)

AD-264 225 Div. 1
(TIPSE/WAW) OTS price $3.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
AN EVALUATION OF A VARIABLE STABILITY AIRPLANE SIMULATION OF THE X-15,
by Donald T. Berry. Sep 61, 26p. incl. illus. tables (Rept. no. AFFTC TR 61-42)
Unclassified report

DESCRIPTORS: (*Rocket planes of *Hypervelocity vehicles, *Parasite planes, Stability, Control, Simulation.) (Jet training planes, Training planes, Jet planes, Flight testing.) (Test equipment, Stabilization systems, Servo systems.) Roll, Re-entry aerodynamics.

The variable stability airplane simulation of the X-15 consisted of two types of simulations: one with fixed stability derivatives, the other with the stability derivatives varying with time. The fixed derivative simulations represented flight at a constant Mach number and altitude, and in the vicinity of a particular angle of attack. The time varying derivatives were used in a representation of X-15 reentry. The fixed derivative simulations proved to be more useful than the reentry simulations. The reentry simulations were somewhat impeded by the requirement to perform special maneuvers in the T-33 to simulate reentry load factors, the performance limitations of the T-33, and the fact that the simulation was restricted to a strictly predetermined flight profile. The Cornell Aeronautical Laboratory T-33 did vary its handling qualities through a range comparable to the X-15, but consistent matches of X-15 characteristics were not obtained because of system malfunctions. These malfunctions were evidently caused by the effect of high ground temperatures on transistorized equipment. The Cornell Aeronautical Laboratory variable stability airplane demonstrated great potential for technical support applications at the Air Force Flight Test Center when systems reliability is improved. (Author)

AD-264 289 Div. 1, 30
(TIPSB/MS) OTS price $1.60

Douglas Aircraft Co., Inc., El Segundo, Calif.
SUMMARY OF LOW-SPEED WIND TUNNEL TESTS ON A 12.5%-SCALE MODEL A4D-5 ESCAPE CAPSULE,
by A. R. Sutliff. 11 July 61, 18p. incl. illus. (Rept. no. ES 40403)
(Contract NOa (s) 61-0404-t)
Unclassified report

DESCRIPTORS: (*Jettisonable cockpits, Configuration, Design, Tests.) (Aerodynamics, Stability, Wind tunnels, Wind tunnel models.)

A brief series of tests were conducted on a 12.5%-scale model A4D-5 escape capsule in the Douglas El Segundo 30 x 45-inch low-speed wind tunnel to obtain the aerodynamic characteristics of the basic capsule configuration after ejection from the airplane and to determine the effects of the nose gear door and of various stabilizing devices on the capsule logitudinal, lateral and directional stability. Results of these limited tests indicate that the basic capsule configuration is statically unstable longitudinally and directionally but that sufficient stability can be achieved through the use of stabilizing surfaces with further wind tunnel development. In this connection it would also be noted that the level of required static stability is subject to a dynamic analysis of the capsule motions. (Author)

AD-264 292 Div. 1
(TIPSB/MS) OTS price $2.60

Douglas Aircraft Co., Inc., El Segundo, Calif.
CAPSULAR COCKPIT. WEIGHT AND BALANCE ANALYSIS OF,
by D. P. Marsh. 26 Jan 61, rev. 29 June 61, 19p. incl. illus. tables (Rept. no. ES 40258)
(Contract NOw 61-0404-t)
Unclassified report

DESCRIPTORS: (*Cockpits, *Jettisonable cockpits, Configuration, Design, Load distribution.)

AD-264 321 Div. 1
(TIPSE/CCD) OTS price $11.00

General Dynamics Convair, San Diego, Calif.
DEVELOPMENT OF A HIGH-TEMPERATURE, NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES.
Semiannual rept. for 25 Mar 60-24 Sep 61. 24 Sep 61, 141p. incl. illus. tables (Report no. ZR-1001-10)
(Contract AF 33(616)7582)
Unclassified report

DESCRIPTORS: (*Pneumatic systems, Control systems, Test equipment, *Aircraft, Materials, Design.) (Pneumatic devices, Nuclear energy, Thermal radiation, Radiation damage, Radiation effects, Temperature.) (Pneumatic valves, Pneumatic servomechanisms, High pressure valves, Check valves, Pressure regulators, Centrifugal compressors, Control valves, Aircraft equipment, Design, Specifications.) (Control surfaces, Power supplies, Pressure, High temperature research.)

Research on the high-temperature, nuclear-radiation-resistant pneumatic system for flight vehicles was concerned with the procurement of components for subsequent evaluation as part of the test system. Both system and component performance documents are presented which outline the basic design parameters for each of the following items: rotary actuator, servo control valve, pressure regulator, relief valve, accumulator, filter, check valve, cryogenic storage source, and pneumatic compressor and drive unit. The test program document outlines the testing to be performed on each component and on the complete system. The individual component testing includes room-temperature, intermediate-temperature, and high-temperature testing. Testing of the entire system, less the compressor, is to be accomplished on completion of component testing. The pneumatic test system will be mated with the compressor and a seven-hour endurance test will be performed, followed by a complete system test under a nuclear radiation environment. (Author)

AD-264 356 Div. 1, 19
(TIPSE/CRJ) OTS price $3.60

Cook Research Labs., Morton Grove, Ill.
ADVANCED HIGH DENSITY LANDING SYSTEM STUDY.
Quarterly rept. no. 2, 2 Apr-2 July 61 on A Study to Investigate Tactical High Density Landing System Problems for the Purpose of Recommending an Advanced System which will Fulfill the Army's Requirements in 1965,
by E. C. Gregory. 2 July 61, 38p. incl. illus.
(Contract DA 36-039-sc-87260)
Unclassified report

DESCRIPTORS: (*Military aircraft, *Helicopters, *Airplane landings, *Instrument landings, *Flight paths, Guidance, Automatic pilots, Control.) (*All weather aviation, *Air traffic control systems, Army operations.)

Redetermining and selectable path all-weather landing systems are described. The geo-referenced, aircraft touchdown approach angle as a function of ground speed is reported. Aircraft landing navigation by NAVAID line of position flying is discussed. Continuation of the kinematic approach is appended. (Author)

AD-264 390 Div. 1, 17
(TIPSM/EET) OTS price $3.60

Aeronautical Structures Lab., Naval Air Material Center, Philadelphia, Pa.
VARIABLE AMPLITUDE FATIGUE CHARACTERISTICS OF A SLAB HORIZONTAL TAIL FOR A TYPICAL FIGHTER AIRPLANE,
by Ronald P. Swartz and Maurice S. Rosenfeld.
18 Sep 61, 37p. incl. illus. tables (Rept. no. NAMATCEN ASL 1023, pt. 2)
Unclassified report

DESCRIPTORS: (*Jet planes, *Jet fighters, *Stabilizers (Horizontal tail surface), Control surfaces, Structures, Fatigue (Mechanics), Failure (Mechanics), Countermeasures, Life expectancy, Theory, Load distribution, Stresses Mathematical analysis, Tests, Test methods, Test equipment.)

Fatigue tests of 12 identical, unused slab horizontal tail surfaces (stabilators) were performed to study the effect of cumulative damage on a typical full-scale aircraft structure. Three specimens were tested for a basic maneuver load spectrum and three specimens were tested for each of three variations of the basic spectrum. The experimental lives were compared with lives estimated by the Miner-Palmgren, tangent-intercept, and Corten-Dolan methods. The Corten-Dolan hypothesis consistently provided the best comparison with experimental data. To further substantiate the applicability of this hypothesis, data from 2 wing investigations and from a stabilator preloading investigation were analyzed and the results compared favorably with the experimental lives. The effect of cutting off the load frequency curve at the high and low load ends was also investigated. As anticipated by the Corten-Dolan hypothesis, elimination of the highest load level in a load spectrum has considerable effect on the fatigue life. (Author)

AD-264 485 Div. 1
(TIPSE/VB) OTS price $14.00

Vertol Div., Boeing Airplane Co., Morton, Pa.
FUNDAMENTALS OF HELICOPTER STABILITY AND CONTROL.
Feb 61, 204p. incl. illus. tables, 39 refs.
(Rept. no. R 242)
(Contract NOw 60-0469-f)
Unclassified report

DESCRIPTORS: (*Helicopters, Control systems, *Control, Maneuverability, *Stability, Stability (Logitudinal), Stability (Lateral), Aerodynamics, Handbooks.) (Helicopter rotors, Coaxial helicopter rotors, Mathematical analysis, Tail helicopter rotors.)

Contents:
Introduction to Helicopter stability and control
Single rotor helicopter
Tandem helicopter
Synchropter
Coaxial helicopter
Evaluation of helicopter stability and control
Systems analysis of helicopter dynamics, and open loop
System analysis of helicopter stabilization, closed loop
Stability devices

AD-264 560 Div. 1, 9
(TIPSE/WAW) OTS price $8.10

Kellett Aircraft Corp., Camden, N. J.
AN INVESTIGATION OF VTOL OPERATIONAL PROBLEMS DUE TO DOWNWASH EFFECTS,
by R. Pruyn. 12 June 61, 86p. (Rept. no. 179T80-2)
(Contract NOw 60-0450-f)
Unclassified report

DESCRIPTORS: (*Vertical take-off planes, *Helicopter rotors, Wake, Downwash, *Convertible airplanes, *Ground effect.) (Sand, Snow, Soils, Surfaces, Water, Erosion.) (Pilots, Aviation personnel, Military personnel, Hazards, Vision.) (Aircraft equipment, Aerial propellers, Airplane engines, Airframes, Hazards.) Pressure, Vulnerability.

Operational problems of VTOL type aircraft caused by downwash effects were investigated utilizing a 3500 horsepower engine and a 15 ft diameter propeller mounted on a 20 ton crane. Results are presented for various propeller disc loadings up to 60 pounds per square foot, for several types of terrain and for various propeller heights and orientation above the terrain. The effects on pilot vision, ground personnel, equipment, aircraft and on aircraft concealment are presented. The effects of downwash were found to be a major operational problem which could limit the operational utility of VTOL aircraft. (Author)

AD-264 617 Div. 1, 18
(TIPSB/LH) OTS price $19.75

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ASSEMBLY AND FITTING OPERATIONS (SELECTED PARTS) PART II,
by Ye. P. Shekunov, V. V. Boytsov and others.
15 Sep 61, 311p. incl. illus. tables, 12 refs.
(Trans. no. MCL-819 pt. 2)
Unclassified report

DESCRIPTORS: (Aircraft equipment, *Aircraft industry, Aircraft, Construction, Manufacturing methods, *USSR, Technological intelligence, Translations.) Test methods.

AD-264 645 Div. 1, 19
(TIPSE/WAW) OTS price $11.50

Bell Aerosystems Co., Buffalo, N. Y.
AIRCRAFT LANDING SYSTEM COMPATIBILITY STUDY.
C-47D, AN/GSN-5.
Final engineering rept.
June 61, 151p. incl. illus. tables (Rept. no. 60003-041)
(Contract AF 33(616)6483)
Unclassified report

DESCRIPTORS: (*Transport planes, Navigation, *Instrument landings, All weather aviation.) (*Ground controlled approach radar, Stability, Errors, Simulation, Effectiveness.) (Velocity, Control systems, Servo systems, Design, Effectiveness, Installation.) (Radar reflectors, Radar beacons, Design, Installation.) (Air control centers, Mobile.) Automatic pilots, Safety.

Research concerns the landing control, central, AN/GSN-5 which is a ground-based, final approach navigation system providing three basic approach and landing techniques, namely, completely automatic control, cross-pointer guided approach, and talkdown. These techniques may be used singularly or in combination. In all cases, however, aircraft surveillance and guidance information were maintained to touchdown. The study of the compatibility of the C-47D aircraft, the E-4 autopilot, and the Landing Control, Central, AN/GSN-5 indicated that, with the airborne and ground units conforming to the performance requirements stated herein, the aircraft and the AN/GSN-5 system were compatible, and that satisfactory all weather automatic final approaches and landings could be made. The aircraft was also compatible with the AN/GSN-5 system for cross pointer or talkdown guided approaches. (Author)

AD-264 646 Div. 1, 19
(TIPSE/WAW) OTS price $11.00

Bell Aerosystems Co., Buffalo, N. Y.
AIRCRAFT LANDING SYSTEM COMPATIBILITY STUDY.
C-130A. AN/GSN-5.
Final engineering rept.
July 61, 148p. incl. illus. tables (Rept. no. 60003-042)
(Contract AF 33(616)6483)
Unclassified report

DESCRIPTORS: (*Transport planes, Navigation, *Instrument landings, All weather aviation.) (*Ground controlled approach radar, Stability, Errors, Simulation, Effectiveness.) (Velocity, Control systems, Servo systems, Design, Effectiveness, Installation.) (Radar reflectors, Radar beacons, Design, Installation.) (Air control centers, Mobile.) Automatic pilots, Safety.

Research concerns the landing control, central, AN/GSN-5 which is a ground-based, final approach navigation system providing three basic approach and landing techniques, namely, completely automatic control, cross-pointer guided approach, and talkdown. These techniques may be used singularly or in combination. In all cases, however, aircraft surveillance and guidance information are maintained to touchdown. The study of the compatibility of the C-130A airplane, the E-4 autopilot, and the Landing Control, Central, AN/GSN-5 indicated that the aircraft and the AN/GSN-5 system were compatible, and that satisfactory all weather automatic final approaches and landings could be made. The aircraft was also compatible with the AN/GSN-5 system for cross-pointer or talkdown guided approaches. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-263 901 Div. 2, 25
(TIPSP/WH) OTS price $2.60

Kiruna Geophysical Observatory (Sweden).
DISTURBANCE DEPENDENCE OF THE SIGNAL STRENGTH FOR OBLIQUE 90 MC AURORAL REFLECTIONS,
by Alv Egeland, 20 Apr 61, 29p. incl. illus. tables (Scientific rept. no. 3)
(Contract AF 61(052)418)
(AFCRL-725) Unclassified report

DESCRIPTORS: (*Aurorae, *Electromagnetic wave reflections, Radio signals, *Echo ranging, Very high frequency.) (Radio transmitter, Frequency modulation, Radio receivers, Sweden, *Atmospherics.)

The distance dependence of signal strength for simultaneous oblique auroral reflections from three transmitter stations (Kemi on 92.8 mc, Ylivieska on 94.0 mc and Jyvaskyla on 92.2 mc was investigated. The stations were situated approximately in the same direction from Kiruna but at different distances. The most important characteristics of the distance dependence of auroral reflections from the three transmitters is summarized. For less than 20% of the time for which reflections from Kemi (the nearest transmitter) were received, echoes were obtained simultaneously from the two other transmitters. The frequency of occurrence and the intensity of auroral echoes decreased rapidly with the distance between the receiver and transmitter. For a few, short periods, the echo intensity was greater for the Ylivieska transmitter than for Kemi, which is nearer to Kiruna. The fine structure of the auroral echoes were seldom identical or even similar for the three transmitters. (Author)

AD-263 912 Div. 2
(TIPSP/GRW) OTS price $11.00

Naval Air Station, Norfolk, Va.
JET STREAM CLIMATOLOGY AT 500 mb NORTH OF 50 DEGREE N.
June 61, 138p. incl. illus. table (Rept. no. NWRF 20-0661-045)
Unclassified report

DESCRIPTORS: (*Meteorological charts of *Jet streams (Meteorology), Barometric pressure for Northern hemisphere.) (Climate, Meteorological data, Periodic variations.)

AD-263 913 Div. 2, 8
(TIPSE/DLW) OTS price $1.60

National Bureau of Standards, Boulder, Colo.
A MICROWAVE HYGROMETER RESEARCH STUDY.
Final rept.,
by R. E. McGavin and B. R. Bean. 12 May 61, 14p. incl. illus. (NBS rept. no. 6774)
(Sponsored by the Army Electronic Proving Ground)
Unclassified report

DESCRIPTORS: (*Hygrometers, Humidity-sensitive elements, *Recording devices, Microwave equipment, Meteorological instruments, Refractometers, Design, Feasibility studies.) (Atmosphere, Atmospheric refraction, Refractive index, Humidity, Pressure, Temperature, Measurement, Meteorological data.)

A feasibility study was made of converting a microwave refractometer into a hygrometer. Since the refractive index is a function of pressure, temperature and humidity, this conversion implies conditioning the air sample to constant pressure and temperature. Hygrometer accuracy is determined by the accuracy of the pressure and temperature control system as well as the refractometer itself. The present state of the art indicates a different type of refractometer for absolute measurement of humidity as compared to relative measurements of gradient. Conventional pressure and temperature control systems will yield absolute measurements within ± 0.5 gm/cu m in water vapor density; relative measurements may approach ± 0.05 gm/cu m. Use of sophisticated control systems may reduce these figures by less than an order of magnitude. (Author)

AD-263 922 Div. 2
(TIPSP/WH) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 1, Jan-May 60.
31 May 60, 10p.
Unclassified report

DESCRIPTORS: (*Ionosphere, Electrons, Density.) (*Thermal radiation, Sun, Solar energy.) (*Van Allen radiation belt, Cosmic rays.) (Earth, Electric fields, Electrical conductance, Terrestrial magnetism.) Atmospheric electricity. (*Astrophysics, Geophysics.) (Translation, USSR, Technological intelligence.)

Soviet material dealing with developments in astrophysics and geophysics for the period January thru May 1960 is reviewed. The material treats the following subjects: ionospheric electron concentration, solar radiation and the ionosphere, the Van Allen belts and cosmic rays, earth currents, and atmospheric electricity.

AD-263 943 Div. 2, 8
(TIPSP/WH) OTS price $7.60

Norwegian Defence Research Establishment.
ON THE SPORADIC E IONIZATION IN AND NEAR THE AURORAL ZONE.
Final project rept.,
by B. Maehlum. Apr 61, 71p. incl. illus. tables, 57 refs. (NDRE Rept. no. 37)
(Contract AF 61(052)228)
(AFCRL-734) Unclassified report

DESCRIPTORS: (*Ionosphere, *Aurorae, Night sky.) (*Electromagnetic waves, Reflection, Attenuation, Measurement.) (Echo ranging, Radio transmitters, Ionospheric disturbances, Periodic variations, Diurnal variations, Arctic regions, Norway.) (Particles, Ionization, Atmosphere.) Atmospheric sounding.

Contents:
The sporadic E auroral zone
The different Es types observed in and near the visual auroral zone
Large-scale structure of the sporadic E auroral zone
Variations in the maximum plasma frequency of the sporadic E layer in the auroral zone
Small-scale structure and drift in the sporadic E layer as observed in the auroral zone
Structure of the amplitude pattern
Movement of the amplitude pattern
Sporadic E drift and magnetic activity
Discussion of the observational results
Daytime Es ionization near the auroral zone
Diurnal and seasonal variations
Types of Es traces observed in the daytime
Daytime Es and magnetic activity
Large-scale structure in the daytime Es layer

AD-263 948 Div. 2
(TIPSP/WH) OTS price $1.60

Radio Observatory, Calif. Inst. of Tech., Owens Valley, Calif.
RADIO EMISSION FROM JUPITER AT A WAVELENGTH OF 31 CM,
by J. A. Roberts and G. J. Stanley. 1959, 10p. illus. 20 refs.
Unclassified report

DESCRIPTORS: (*Jupiter, *Planetary atmospheres, Electromagnetic waves, Infrared radiation, Van Allen radiation belt, Magnetic fields.) (Astronomy, *Radio astronomy, Radiometers, *Extraterrestrial radio waves, Ultrahigh frequency.) Planets.

Radio emission from Jupiter was measured at a wavelength of 31 cm. The mean equivalent disk temperature is 5.5 x 1000 K. Two possible sources of the radiation are discussed: free-free transitions in a Jovian corona, and synchrotron emission from a Jovian van Allen belt. (Author)

AD-263 949 Div. 2
(TIPSP/WH) OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Owens Valley, Calif.
POSITIONS AND SUGGESTED IDENTIFICATIONS FOR THE RADIO STARS HYDRA-A AND HERCULES-A,
by J. A. Roberts, J. G. Bolton, and D. E. Harris. 1959, 6p. illus. tables.
Unclassified report

DESCRIPTORS: (Astronomy, *Radio astronomy, *Extraterrestrial radio waves, Position finding, *Stars, Identification.)

Position measurements of two radio stars confirm the identification of Hydra-A with a close pair of galaxies and suggest that Hercules-A may be a very distant elliptical. (Author)

AD-263 960 Div. 2, 30
(TIPSP/GRW) OTS price $1.10

Ramo-Wooldridge Corp., Los Angeles, Calif.
MATHEMATICAL ANALYSIS AND ANALOG SIMULATION OF ATMOSPHERIC TURBULENCE GUST VELOCITIES,
by Julius S. Bendat. 1955, 9p. incl. illus.
Unclassified report

DESCRIPTORS: (Turbulence, *Atmosphere, Determination.) (Measurement, *Velocity, *Gusts by Analog computers.) (Mathematical analysis, Spectrographic data by *Statistical functions.)

A mathematical procedure is suggested which helps explain many results observed in power spectral density studies of atmospheric turbulence phenomena. On the basis of empirical evidence, random processes associated with gust velocities are assumed to have continuous autocorrelation functions of a simple or slightly modified damped exponential-cosine form. Consequences of this assumption are explored. A mechanization is developed to generate on an analog computer various input gust velocity power spectra. Significant engineering results can thus be obtained on the expected operation of existing or proposed physical systems. (Author)

AD-264 066 Div. 2
(TIPSP/GRW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
NEWS OF TUNGUSKA METEORITE,
by V. G. Fesenkov and E. L. Krinov, tr. by Z. Jakubski. Apr 61, 9p. incl. illus. (Rept. no. STL-TR 61-5110-21, Trans. from Vestnik Akademii Nauk SSSR, no. 12, 1960)
Unclassified report

DESCRIPTORS: (*Meteorites, Flight paths.) (Earth, USSR, Penetration, Explosion damage, Analysis.) (Translations, USSR.)

AD-264 120 Div. 2
(TIPSP/GRW) OTS price $11.00

Arctic Inst. of North America, Washington, D. C.
GLACIOLOCICAL OBSERVATIONS IN NORTHERN ELLESMERE ISLAND. 1959,
by Paul W. Walker and William G. Mattox, Jr.
May 61, 139p. incl. tables (Scientific rept. no. 13)
(Contract AF 19(604)3073)
(AFCRL-609) Unclassified report

DESCRIPTORS: (*Geological survey, *Glaciers, Arctic regions.) (Terrain, Surface properties.) (Ice, Snow, Melting, Erosion, Tables.)

Field observations obtained at the Ward Hunt Ice Shelf during the summer of 1959 are tabulated. These include temperatures, snow densities, hardness numbers, and descriptive remarks based on 14 pit studies made in early June and repeated in early July. Snow depths and densities are listed for a grid of 70 ablation stakes and a series of 44 stakes along a survey line across the north-south extent of the shelf. (Author)

AD-264 145 Div. 2, 24
(TIPSP/WH) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
MOTION PICTURE STUDIES ON THE MOTION OF NOCTILUCENT CLOUDS,
by N. I. Grishin, tr. by Z. Jakubski. Aug 61, 8p. incl. illus. table (Rept. no. STL-TR-61-5110-44, Trans. from Meteorologiya i Gidrologiya, Leningrad, no. 3, pp. 34-47, 1957)
Unclassified report

DESCRIPTORS: (*Clouds, Motion of Ions, Particles, Meteorites, Upper atmosphere.) (*Photographic analysis, *Motion picture photography.) (Translations, USSR, Technological intelligence.)

AD-264 160 Div. 2, 25
(TIPSP/GRW) OTS price $9.60

Space Technology Labs., Inc., Los Angeles, Calif.
PHOTOGRAPHIC PHOTOMETRY OF VENUS,
by V. I. Yezerskii, tr. by Z. Jakubski. July 61, 109p. incl. illus. tables, 56 refs. (Rept. no. STL-TR 61-5110-40, Trans. from Transactions of A. M. Gor'ki Astronomical Observatory, Kharkov State University, 12:73-165, 1957)
Unclassified report

DESCRIPTORS: (Planets, *Venus, *Brightness, Measurement, Microphotometers.) (*Planetary atmospheres, Photographic analysis, Physical properties.) (Spectrographic data, Tables.) (USSR, Translations.)

AD-264 161 Div. 2
(TIPSP/GRW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE DEVELOPMENT OF PLANETARY COSMOGONY,
by B. Yu. Levin, tr. by Z. Jakubski. June 61, 17p. incl. illus. (Rept. no. STL TR 61-5110-37, Trans. from Priroda (Nature) no. 10, 19-26, 1959)
Unclassified report

DESCRIPTORS: (*Astronomical data, Solar systems, *Planets, Sources.) (Materials, Interstellar matter of Gases, Aerosols, Particles.) (*Earth, Surface properties, Physical properties.)

All contemporary investigators in the field of planetary cosmogony consider that the planets were formed from a cold cloud of gas and dust in the vicinity of the sun. However, the opinions of scientists differ as to the origin of the cloud itself and the process of formation of planets from it. The majority consider that the principal process in planet formation was the accumulation of cold solid particles. Only the American astronomer Kuiper and Academician V. G. Fesenkov assume the disintegration of a protoplanetary cloud into large, massive protoplanets which subsequently, by decreasing their masses, became the present-day planets. In addition, all scientists except V. G. Fesenkov hold that the earth was formed as a cold body and only after its formation was heated by the accumulation of radioactively generated heat. (Author)

AD-264 164 Div. 2, 25
(TIPSP/WH) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
APPROXIMATE SOLUTION OF THE FUNDAMENTAL PROBLEM OF RADIANT ENERGY TRANSFER IN A PLANE-PARALLEL LAYER (CHAPTER X),
by V. V. Sobolev, tr. by K. N. Trirogoff.
Mar 61, 36p. incl. illus. (Rept. no. STL-TR 61-5110-6, Trans. from Radiant Energy Transfer in the Atmospheres of Stars and Planets, pp.382-384, 1956)
Unclassified report

DESCRIPTORS: (*Light, *Monochromatic light, *Scattering, Reflection, Optics.) (Planetary atmospheres, Venus, Earth, Atmosphere, Planets, Sky brightness, Sea water.) (USSR, Translations, *Astrophysics.)

Study concerned the scattering of monochromatic radiation in a plane layer illuminated by parallel rays under stationary conditions. The indicatrix of scattering is held as arbitrary.

First the case of pure scattering is considered, then the process of true absorption is included. The equations obtained are applied to the atmospheres of the earth and planets and to the sea. (Author)

AD-264 167 Div. 2, 25
(TIPSP/GRW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
SUMMARY CATALOG OF THE ABSOLUTE VALUES OF THE VISUAL REFLECTING POWER AT FULL MOON OF 104 LUNAR OBJECTS,
by N. N. Sytinskaya, tr. by P. F. Lesgaft.
May 61, 13p. incl. illus. tables (Rept. no. STL-TR 61-5110-24, Trans. from Astronomical Journal (USSR), Vol. 30, no. 3, 1953)
Unclassified report

DESCRIPTORS: (*Extraterrestrial geography, Tables, *Moon, Optical analysis.) (Terrain, Surface properties, Catalogs, *Brightness, Measurement.) (Light, Reflection, Determination.)

Absolute values of the reflecting power of various details of the lunar disk, obtained by different observations and expressed in the form of the brightness factor, are reduced to a single standard system and presented as average values. The catalog of these values is used for some statistical comparisons. (Author)

AD-264 169 Div. 2, 25
(TIPSP/GRW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
PHOTOMETRICAL RELIEF OF THE LUNAR SURFACE,
by N. S. Orlova, tr. by K. N. Trirogoff and Z. Jakubski. Mar 61, 14p. incl. illus. table. (Rept. no. STL-TR 61-5110-13, Trans. from Akademii Nauk SSSR, Astronomicheskii Zhurnal, Vol. 33, no. 1, 1956)
Unclassified report

DESCRIPTORS: (*Brightness of *Moon, Measurement, *Optical analysis.) (Light, Reflection, Albedo (Astronomy).) (*Extraterrestrial geography, Terrain, Surface properties, Determination.) (Refractive index, Tables.) Moon, Photometers.

Measurements of the brightness of the lunar surface and the absolute measurements of brightness were reduced. Supposing the surface of the continents and the surface of the seas as similar in all points of the lunar disk, average coefficients of brightness (brightness factor, albedo) were deduced for various combinations of the angles of incidence and reflection. Results related with the plane of incidence of the solar rays for seas and for continents are given. If the results are represented in the form of a polar diagram of reflectivity (diffusion function), then a group of curves is obtained, extremely extended in the direction to the sun at any angles of incidence of solar rays. Curves for the seas are similar to those for the continents. The similarity of the character of curves shows that the unevenness of the lunar surface is extreme and is the same for the seas and the continents. Diffusion diagram of the moon exceeds considerably the investigated terrestrial samples according to their extension. This relation shows that the surface of the moon is covered with extremely porous matter, similar to slags of a spongy structure. (Author)

AD-264 185 Div. 2, 25
(TIPSP/GRW) OTS price $8.60

Visibility Lab., U. of Calif., San Diego.
ATMOSPHERIC OPTICAL MEASUREMENTS DURING HIGH ALTITUDE BALLOON FLIGHT, PART II, SKY LUMINANCES,
by Almerian R. Boileau. July 61, 96p. incl. illus. tables (SIO Ref. no. 61-1)
(Contract NObs-72092)
Unclassified report

DESCRIPTORS: (*Atmosphere, *Optical analysis, *Sky brightness.) (*Meteorological balloons, Optical instruments, Meteorological instruments, High altitude.) (Optical images, Transmission.)

Certain optical measurements of the atmosphere were made on 21 June 1958, over central Minnesota. Data were recorded from daybreak to midmorning during the time four balloons carrying optical instrumentation were floating at a higher altitude. The sky luminance distribution is recorded as it varied with altitude, zenith angle, and azimuth with respect to the sun. (Author)

AD-264 188 Div. 2
(TIPSP/GRW) OTS price $8.10

Arctic Inst. of North America, Washington, D. C.
ANALYSIS OF METEOROLOGICAL AND MICROMETEOROLOGICAL OBSERVATIONS, NORTHERN ELLESMERE ISLAND. 1959,
by J. R. Lotz. May 61, 81p. incl. illus. tables, 22 refs. (Scientific rept. no. 12; Research paper no. 12)
(Contract AF 19(604)3073)
(AFCRL-488) Unclassified report

DESCRIPTORS: (Northwest territories, Arctic regions, *Micrometeorology.) (Meteorological data, Determination, *Ice, *Snow, Melting, Tables.) (Climatic factors, Wind, Precipitation, Temperature.)

This analysis deals with meteorological data obtained at the Ward Hunt Ice Shelf, Northern Ellesmere Island, in the summer of 1959. This includes a commentary on the meteorological and micrometeorological data, and an account of some factors involved in ablation of the ice. (Author)

AD-264 189 Div. 2
(TIPSP/GRW) OTS price $4.60

Arctic Inst. of North America, Washington, D. C.
A STUDY OF SOME PROPERTIES OF SEA ICE,
by Don L. Anderson. June 61, 36p. incl. illus. tables (Scientific rept. no. 14; Research paper no. 11)
(Contract AF 19(604)3073)
(AFCRL-649) Unclassified report

DESCRIPTORS: (*Sea water, *Ice, Growth, Physical properties, Salinity, Density, Tables.) (Sea water, *Physical chemistry, Ion exchange, Thermal conductivity.)

It is possible to determine the phase relations in sea ice from ion concentration measurements on the unfrozen brine. From the composition and structure such physical properties as strength, thermal conductivity, and permeability may be calculated. All of the physical properties of sea ice change rapidly after freezing begins until the temperature of the ice is about -5 C. The anomalous behavior of strength, density, coefficient of volume expansion, specific heat,

latent heat, and conductivity can be explained by the continuous phase changes taking place at all temperatures. The heat of crystallization of solid salts is found to be small but not negligible in comparison with other thermal effects. (Author)

AD-264 199 Div. 2
(TIPSP/WH) OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Owens Valley, Calif.
A STUDY OF CENTAURUS-A/NGC 5128 AT 31 cm,
by J. G. Bolton and B. G. Clark. 1959, 8p. incl. illus.

Unclassified report

DESCRIPTORS: (*Stars, Electromagnetic waves, *Extraterrestrial radio waves, Ultra high frequency.) (Astronomy, *Radio astronomy, Interferometers.) *Galaxies.

A study of Centaurus-A/NGC 5128 at 960 mc shows that the radio extensions are visible in the decimeter wavelength range as well as at meter wavelengths. A comparison of the results at 960 mc and 85 mc shows that the brightness distributions are very similar, thus the spectrum of the radio emission is independent of the region of emission. The brightness distribution can be clearly separated into at least three components, a central source and two extended sources. The two extended sources resemble the two-source distribution of Cygnus-A determined from interferometry. (Author)

AD-264 296 Div. 2, 15, 30
(TIPSP/MFA) OTS price $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SATELLITE MOTION ABOUT AN UNSYMMETRICAL BODY,
by H. Lass and J. Lorell. 20 May 59, 7p. (External Publication no. 646)
(Contract NASw-6)

Unclassified report

DESCRIPTORS: (*Asymmetric bodies, *Moon, Surfaces, *Satellites, *Motion, *Celestial mechanics, Orbital flight paths.) (Equations, Numerical analysis, Perturbation theory, Differential equations, Integration.)

The integrability of the equations of motion of a particle in a plane attracted by two fixed Newtonian centers of force in the plane of motion is examined. An analysis of the solution of this problem which involves elliptic functions has recently been given by R. R. Newton (Jnl. Appl. Physics, 30(1):115-117, 1959) in relation to the number of rotations of a satellite of the moon before impact with the moon occurs. The motion of the satellite is studied by applying the nonlinear technique of Kryloff-Bogoliuboff (Introduction to Nonlinear Mech., J. W. Edwards, Ann Arbor, Mich., 1947) and show that if the perturbing mass is close to the principal center of force, the motion of the satellite remains essentially elliptic. (Author)

AD-264 297 Div. 2, 12
(TIPSP/MFA) OTS price $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
INTERPLANETARY POST-INJECTION GUIDANCE,
by Maxwell Noton. 4 June 59, 37p. incl. illus. tables (External Publication no. 653)
(Contract NASw-6)

Unclassified report

DESCRIPTORS: (Astronomy, *Space flight, *Planets, Atmosphere entry.) (Guidance, *Guided missiles, Rockets, Rocket trajectories, Rocket motors, Orbital flight paths, Radio receivers.) (*Celestial navigation, Celestial mechanics, Instrumentation, *Earth, Venus, Mars, Moon.) (*Digital computers, Data storage systems, Programming.) (Geometry, *Perturbation theory, Differential equations.) Tables.

Systems of mid-course and terminal guidance that might be applied to interplanetary missions in the next five years are considered. The necessary theoretical background is developed for the formation of guidance equations and for carrying out error analyses. Mid-course guidance both by radio command and with a celestial navigator is discussed, backed up by error-analyses for special cases. The over-all accuracy of a radio-command system is estimated, and representative figures are derived to illustrate the goal of hardware development for celestial navigators. Terminal guidance prior to entry into planetary atmospheres is discussed. (Author)

AD-264 352 Div. 2
(TIPSP/TL) OTS price $7.60

North American Aviation, Inc., Downey, Calif.
PROCEEDINGS OF LUNAR AND PLANETARY EXPLORATION COLLOQUIUM. VOLUME II, NUMBER 3.
15 Aug 61, 78p. incl. illus. tables.

Unclassified report

Publication of the Ninth Lunar and Planetary Exploration Colloquium meeting held at North American Aviation, Downey, California, on November 2 and 3, 1960.

DESCRIPTORS: (Lunar probes, *Spaceships, *Planets, Exploration, *Astrophysics, Mars, Planetary atmospheres, Periodic variations, Extraerrestrial geography, Terrain, *Moon, Physical properties, Celestial mechanics.) (Conferences, *Symposia.)

A report is made from a collection of papers and discussion regarding lunar and planetary exploration. The subjects presented are on lunar physics and topography, planetary studies, lunar experiments, and lunar exploration vehicles.

AD-264 454 Div. 2
(TIPSE/RD) OTS price $13.00

Seismograph Service Corp., Tulsa, Okla.
FIELD TESTS OF AZDEQ IN AZIMUTH DETERMINATION AND POSITIONING. PHASE I. AZIMUTH TESTS. BASIC DATA SUPPLEMENT.
Final technical rept., 15 Jan-23 Oct 60,
by M. H. Curlin, J. B. Roberts, and G. A. Kite.
23 Oct 60, 110p. incl. illus. tables.
(Contract DA 44-009-eng-4200, Proj. 8-35-10-500)

Unclassified report

DESCRIPTORS: (*Azimuth, *Determination, *Position finding, Tests, Terrain.) (Geodesics, Astronomy, Geophysics, Geography.) Data processing systems, Electronic equipment.

This report describes field tests of AZDEQ performed to evaluate capabilities of equipment and

methods for electronic measurement of geodetic azimuths. The tests involved the measurement of the azimuths of: (1) lines in a quadrilateral in northeastern Oklahoma, and (2) three lines whose lengths were 92, 214 and 409 miles. The report includes descriptions of the equipment used, field operations, operational methods, computational procedures, and results for each method employed. These methods were (1) Ground-to-Ground, (2) Positioning by Azimuth Intersection, and (3) Line-Crossing. The tests demonstrated that (1) the equipment is capable of making accurate azimuth measurements in a range of 12 to 500 miles, (2) the method of measurement are operationally sound but a need is indicated for better control of calibration and better control of the aircraft flight path, (3) the observation equations and computational procedures are sufficient, and (4) some equipment modifications and design changes are desirable to realize fully the AZDEQ accuracy potential.

AD-264 471 Div. 2
(TIPSB/LH) OTS price $6.60

Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A SOIL SAMPLING TECHNIQUE AND MEASUREMENT OF DEAGGLOMERATION OF SIX SOILS TO DETERMINE DUST PRODUCING CAPABILITY,
by Carl A. Hafer. Oct 60, 63p. incl. tables. (Contract DA 23-072-ORD-1375, Proj. TB5-1401)
Unclassified report

DESCRIPTORS: (*Soils, *Sand, Dust explosions, Dust storms, Distribution, Microstructure, Measurement, Collecting methods.)

A technique was developed for obtaining soil samples for purposes of soil particle (dust) size distribution measurement. A method of determining or predicting the dustiness of soils through quantitative measurement of dust size particles within the surface (active) soil is presented. Six soils were exposed to vehicle (M38A1 truck) traffic. Surface soil samples were collected after various numbers of vehicle passes and the size distribution analysis of each sample was made. The deagglomeration or breakdown of the surface soil below approximately 74 microns is assumed representatively of the dustiness potential of the soil. Other factors concerning dustiness of soils are discussed. (Author)

AD-264 484 Div. 2
(TIPSP/GRW) OTS price $10.50

Uppsala U. (Sweden).
BIHOURLY DIAGRAMS OF FORBUSH DECREASES,
by Arne Eld Sandstrom. 29 Sep 60, 131p. incl. illus. tables (Technical note no. 4)
(Contract AF 61(514)1312)
(AFCRL TN 60-828) Unclassified report

DESCRIPTORS: (*Cosmic rays, Counting methods by Cosmic ray telescopes, Intensity.) (Statistical data, Statistical distributions, Tables.) (Periodic variations in Sweden.)

Bihourly diagrams were made of Forbush decreases of cosmic ray intensity as observed at Uppsala from 31 Aug 56 to 31 Dec 59, at Kiruna from Nov 56 to 31 Dec 59, and at Murchison Bay from 26 Aug 57 to 30 Apr 59. (Author)

AD-264 497 Div. 2, 25
(TIPSP/WH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
RADIO EMISSION FROM COMETS,
by O. V. Dobrovol'skiy. 1 Sep 61, 16p. incl. table, 37 refs. (Trans. no. MCL-1221 of Byul. in-ta Astrofiz. AN TadzhSSR 26:3-11, 1958)
Unclassified report

DESCRIPTORS: (*Radio signals from *Comets, Detection, and *Radio astronomy.) (*Radiometers, Bremsstrahlung, Infrared radiation, Ionization, Electrons.) (Translations, USSR, Astronomy.)

A current research on radio emission from comets is reviewed. Observer data are tabulated from stations in Ohio, Australia, Holland, Belgium and Germany. The radio mechanisms studied are of both equilibrium and nonequilibrium types. An extensive bibliography is included.

AD-264 507 Div. 2, 9
(TIPSP/WH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ON THE CALCULATION OF HIGH PRESSURE BALLOONS,
by B. M. Lukyanov. 1 Sep 61, 13p. incl. illus. table (Trans. no. MCL-1167 of Izvestiya Vysshikh Uchebnykh Zavedeniy - Aviatsionnaya Tekhnika 1:125-133, 1959)
Unclassified report

DESCRIPTORS: (*Balloons, Gases, Volume, Body weight.) (*Pressure vessels, Gas cylinders, Wire, Materials, Pressure, Stresses, Design.) (USSR, Translations, Technological intelligence.)

A general case is discussed for the determination of stresses in the cylinder's wall and in the wire winding, possessing cylindrical anisotropies, along with calculating the effect of axial stretching on the cylinder's wall, at the expenses of gas pressure on the bottom of the balloon. It is assumed that every layer is orthotropic, upon which the anisotropic terminals are located on the cylinder's axis. Theoretical conclusions for a particular case regarding stresses on the surface of the cylinder's internal wall are compared with experimental data. All the reasonings will be justified for the balloon's cylindrical section, where the rim effect seems to be insignificant. (Author)

AD-264 514 Div. 2, 25, 8
(TIPSP/WH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CERTAIN RESULTS OF STUDYING TREMORS FROM STAR TRACES,
by G. Ya. Vasil'yeva. 28 Aug 61, 12p. incl. illus. tables (Trans. no. MCL-1202 of Trudy Soveshchaniya Po Issledovaniyu Mertsaniya Zvezd, Moscow-Leningrad AN SSSR, 1958 and 1959, pp. 165-173)
Unclassified report

DESCRIPTORS: (Astronomy, *Stars, Light, Spectrographic analysis.) (*Optical analysis, Statistical analysis, *Statistical functions, Correlation techniques, *Information theory, Harmonic analysis.) (Translations, USSR, Technological intelligence, Astronomy.)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-264 515 Div. 2
(TIPSP/WH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE THEORY OF THE GRAVITATIONAL FIELD OF A REGULARIZED EARTH,
by I. F. Monin. 18 Sep 61, 7p. (Trans. no. MCL-1341 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Geodesiya I Aerofotos yemka 3:57-61, 1960)

Unclassified report

DESCRIPTORS: (*Earth, Gravity, *Geophysics, Applied mathematics.) (USSR, Translations, Technological intelligence, Geophysics.)

AD-264 573 Div. 2
(TIPSP/GRW) OTS price $1.10

American Meteorological Society, Boston, Mass.
THE EFFECT OF STRATIFICATION ON ATMOSPHERIC HEAT RADIATION (K Voprosu o Vliianii Stratifikatsii na Teplovoe Izluchenie Atmosfery),
by K. Ia. Kondrat'ev and T. K. Iastrebova, tr. by Burton J. Hobson. Jan 61, 5p. incl. illus. (Trans. T-R-344 of Izvestiia Akademii Nauk SSSR, Seriia Geofizicheskaia 6:831-833, 1957)
(Contract AF 19(604)6113)

Unclassified report

DESCRIPTORS: (*Atmosphere, Earth, *Heat transfer, *Climatic factors.) (Convection, Clouds, Temperature inversion, Humidity, Water vapor.) (Translations, USSR.)

AD-264 574 Div. 2
(TIPSP/GRW) OTS price $1.60

American Meteorological Society, Boston, Mass.
AIR CURRENTS IN THE STRATOSPHERE (Vozdushnye Techeniia v Stratosfere),
by V. P. Dubentsov, tr. by Burton J. Hobson. Jan 61, 15p. incl. illus. (Trans. T-R-345 of Meteorologiia i Gidrologiia, No. 11:3-15, 1959)
(Contract AF 19(604)6113)

Unclassified report

DESCRIPTORS: (*Stratosphere, *Wind.) (Corrections of Barometric pressure, Temperature on *Meteorological charts and Temperature charts, Northern hemisphere.) (Atmospheric sounding, Radiosondes.)

All available data from about 500 stations were used in compiling the average maps of the northern hemisphere, but only about half of these stations had soundings that reached the 50- to 30-mb level and still fewer reported soundings for the 10 and 20 mb surfaces, especially for the cold period of the year. The quality of temperature observations in many regions was poor and the preliminary data were not comparable. Correction factors based on the intercomparison of radiosonde systems made in Payerne before the IGY were introduced to make these data comparable, but this was only partially effective. Soviet observations of the 50 mb level and higher showed very low temperature values for the summer months, because the radiation correction for temperature was much too high in many cases. This correction factor was reduced considerably after a comparison was made of day and night ascents. (Author)

AD-264 575 Div. 2, 1, 4
(TIPSP/WH) OTS price $1.10

American Meteorological Society, Boston, Mass.
AIRPLANE APPARATUS FOR MODIFYING SUPERCOOLED CLOUDS AND FOGS (Apparatura Dlia Vozdeistvii na Pereokhlazhdennye Oblaka i Tumany s Samoleta),
by A. I. Voskresenskii and V. G. Morachevskii, tr. by David Kraus. Mar 61, 10p. incl. illus. (Trans. T-R-349 of Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Trudy 228:155-161, 1959)
(Contract AF 19(604)6113)

Unclassified report

DESCRIPTORS: (Airplanes, *Smoke generators, *Artificial precipitation, Fog, Clouds, Arctic regions, Silver compounds, Iodides, Sublimation, Smokes, *Aerosols.) (Carbon dioxide, Solidified gases.) (Translations, USSR, Technological intelligence, Meteorology.)

AD-264 576 Div. 2, 4
(TIPSP/WH) OTS price $1.60

American Meteorological Society, Boston, Mass.
THE EFFECTIVENESS OF CO2 PARTICLES AND AgI SMOKE FOR DISPERSING SUPERCOOLED LOW CLOUDS AND FOGS (Effektivnost' Chastits CO2 i Dyma AgI Dlia Rasseivaniia Pereokhlazhdennykh Oblakov i Tumanov),
by V. G. Morachevskii and V. Ia. Nikandrov, tr. by David Kraus. Apr 61, 9p. incl. illus. tables. (Trans. T-R-355 of Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Trudy 228:135-145, 1959)
(Contract AF 19(604)6113)

Unclassified report

DESCRIPTORS: (*Aerosols, *Carbon dioxide, Solidified gases, Particles.) (Silver compounds, Iodides, Smokes, Smoke generators.) (Translations, USSR, Technological intelligence, Meteorology.) (*Artificial precipitation of Clouds and Fog in Arctic regions.)

AD-264 577 Div. 2
(TIPSP/GRW) OTS price $1.10

American Meteorological Society, Boston, Mass.
SOME DATA ON THE WATER CONTENT OF FOGS IN THE ARCTIC (Nekotorye Dannye o Vodnosti Tumanov v Arktike),
by V. Ia. Nikandrov, tr. by Richard M. Holden. May 61, 4p. incl. illus. table (Trans. T-R-359 of Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Trudy 228:146-148, 1959)
(Contract AF 19(604)6113)

Unclassified report

DESCRIPTORS: (*Atmosphere, *Fog, *Iced fog, Moisture, Abundance.) (Climatic factors, Heat transfer, Arctic regions, USSR.) (Translations, USSR.)

AD-264 578 Div. 2, 25
(TIPSP/WH) OTS price $1.10

American Meteorological Society, Boston, Mass.
DETERMINATION OF THE DENSITY OF THE CENTRAL

COMPONENT IN THE IONOSPHERE (Opredelenie Plotnosti Tsentral'noi Komponenty v Ionosfere), by V. G. Kurt, tr. by Richard M. Holden. June 61, 4p. incl. illus. (Trans. T-R-361 of Vysshie Uchebnye Zavadeniia, Izvestiia, Radiofizika 2:1007-1009, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (*Temperature and Density of *Upper atmosphere.) (Sodium, Vapors, Diffusion in *Ionosphere, Fluorescence.) (Translations, USSR, Meteorology.) Twilight.

A cloud, illuminated by the rays of the sun, shines as a result of resonance fluorescence by which it can be observed from the earth's surface. In this experiment, the sodium vapors were released at 430 km above the earth's surface. During the experiment, the height of the earth's shadow was 300 km. The observations lasted 15 minutes, and about 50 cloud photographs were obtained. At this time, the cloud reached dimensions of hundreds of kilometers. Since each sodium atom experiences a great number of collisions with atmospheric atoms, a diffusion distribution is established in the cloud for a short time interval after the sodium vapor is released (we can show that this time is 100 seconds). (Author)

AD-264 579 Div. 2
(TIPSP/GRW) OTS price $1.60

American Meteorological Society, Boston, Mass.
THE MICROPHYSICAL CHARACTERISTICS OF LOW CLOUDS AND FOGS (Mikrofizicheskie Kharakteristiki Nizkoi Oblachnosti i Tumanov), by A. L. Dergach, tr. by David Kraus. June 61, 20p. incl. illus. table (Trans. no. T-R-362 of Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Trudy 228:55-67, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (*Stratus clouds, *Fog, Sources, Physical properties, Vertical indicators.) (Atmospheric sounding, Aircraft, Arctic regions, USSR.)

During a 1956 expedition, 11 vertical soundings of fogs, 45 soundings of stratus clouds, and 21 soundings of stratocumulus clouds were made. The accumulated experimental data allow us to draw some preliminary conclusions as to the nature of the structure and development of low cloud cover and fog in the eastern part of the western sector of the Soviet Arctic in the fall. All expeditionary flights were made north of 70 degrees N, primarily along the coastal strip of the Ob-Yenisei region and along the western coast of the Taimyr Peninsula. All flights were made above either an open water surface and/or coastal tundra partially covered by snow. In most cases, the flight paths lay over a water surface partially covered with ice. Most observations were made at subfreezing temperatures (from 0 to -10 C), therefore, as a rule, the clouds were supercooled. Half of the observations made in fogs were also made at subfreezing temperatures. (Author)

AD-264 580 Div. 2
(TIPSP/GRW) OTS price $1.10

American Meteorological Society, Boston, Mass.
THE MAIN CAUSE OF THE REGULAR ALBEDO DECREASES OF A MELTING SNOW COVER (Glavnaia Prichina Zakonomernogo Umen'sheniia Al'bedo Taiushchego Snezhnogo Pokrova), by M. A. Kuynetsov, tr. by Burton J. Hobson. May 61, 8p. incl. illus. (Trans. T-R-365 of Problemy Arktiki i Antarktiki 3:112-115, 1960)
Unclassified report

DESCRIPTORS: (*Snow, *Reflection, Terrain, Surface properties.) (Melting, Heat transfer, Climatic factors, USSR, Arctic regions, Antarctic regions.) (Translations, USSR.)

AD-264 581 Div. 2
(TIPSP/GRW) OTS price $1.10

American Meteorological Society, Boston, Mass.
SOME MEASUREMENT RESULTS OF THE THERMAL RADIATION OF THE ATMOSPHERE IN THE DAYTIME (Nekotorye Rezul-taty Izmerenii Teplovogo Izlucheniia Atmosfery v Dnevnoe Vremia), by K. Ia. Kondrat'ev and T. S. Gol'm, tr. by Richard M. Holden. June 61, 6p. incl. illus. (Trans. T-R-366 of Meteorologiia i Gidrologiia 11:37-40, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (*Atmosphere, *Thermal radiation, Wave transmission, Measurement by Optical filters, Diurnal variations.) (Climatic factors, Clouds, USSR.) (Translations, USSR.)

AD-264 582 Div. 2
(TIPSP/GRW) OTS price $1.60

American Meteorological Society, Boston, Mass.
THE VERTICAL STRUCTURE OF SUMMER FOG IN THE DICKSON ISLAND REGION (Vertikal'noe Stroenie Letnikh Tumanov v Raione o. Diksona), by P. A. Vorontsov and V. I. Selitskaia, tr. by Burton J. Hobson. June 61, 17p. incl. illus. table (Trans. T-R-368 of Arkticheskii i Antarkticheskii Institut, Trudy 228:87-99, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (Sources, *Fog, Arctic regions, Kara Sea.) (*Meteorological data, Measurement by Meteorological balloons for Wind direction indicators, Moisture, Temperature inversion.) (Recording devices, Radiosondes.)

In July-August 1957 a number of meteorographs on moored balloons at two points, Dickson Island and Tadibe-Yakha were used to study the vertical structure of the atmosphere during sea and monsoon fogs. Results of the investigations at Dickson Island are given. Meteorograph ascents to a height of 500 m were made every two hours with five-minute stops at 25, 50, 100, 150, 200, 300, 400, and 500 m. The most favorable conditions for the development of sea fog were in Arctic air (AA) masses transferred from the Kara Sea. Monsoon fog developed with polar air (PA) movement above a cold sea surface. Under Dickson Island conditions, this could occur only with winds directed along the shore. Fog in AA masses usually develops in anticyclones. As a rule, there is no fog in PA masses in the Dickson Island region; evidently it is formed over the sea at some distance from the coast. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-264 583 Div. 2, 25
(TIPSP/WH) OTS price $1.60

American Meteorological Society, Boston, Mass.
EARTHQUAKE FREQUENCY AND A SEISMIC ACTIVITY CHART (Povtoriaemost' Zemletriasenii i Karta Seismicheskoi Aktivnosti),
by I. L. Nersesov and Iu. V. Riznichenko, tr. by Burton J. Hobson. July 61, 11p. incl. illus. (Trans. T-R-369 of Seismicheskie i Gliatsiologicheskie Issledovinila v Period Mezhdunarodnogo Geofizicheskogo Goda 2:31-38, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (*Earthquakes, Seismographs, Statistical analysis, USSR, Japan, California.) (Translations, USSR, Geophysics.)

A method is developed for the quantitative determination and charting of regions of seismic activity. These charts are made from experimental data of earthquake frequency in the USSR, Japan, California, and the globe in general.

AD-264 587 Div. 2
(TIPSP/GRW) OTS price $3.60

American Meteorological Society, Boston, Mass.
SELECTIONS FROM INTERDEPARTMENTAL CONFERENCE ON THE PROBLEMS OF INVESTIGATING CLOUDS, PRECIPITATION AND THUNDERSTORM ELECTRICITY (Mezhvedomstvennaia Konferentsiia po Voprosam Issledovaniia Oblakov, Osadkov i Grozovogo Elektrichestva), tr. by Richard M. Holden. May 61, 49p. incl. illus. tables (Trans. T-RC-20 of Gidrometeoizdat, pp. 7-12, 37-42, 53-55, 56-59, 65-73, 81-85, 86-87, 129-130, 1957)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: (*Weather forecasting, Clouds, *Cumulus clouds, *Stratus clouds, *Precipitation, Thunderclouds.) (Climatic factors, Convection, Turbulence, Atmospheric electricity, Jet streams (Meteorology), *Air mass analysis.) (Translations, USSR, Technological intelligence.)

Contents:
Some results of an investigation of intra-air-mass clouds
Role of vertical currents and turbulent mixing in the formation and evolution of stratiform clouds
Experiment in forecasting the concentration of intra-airmass cumulus clouds
The problem of forecasting the concentration of intra-airmass convective clouds
Observations of jet stream clouds in the Moscow region
The problem of forecasting cloudiness: present status and leading investigations
Cloud systems of the Black Sea
Some problems of the spectral transparency of clouds and fogs

AD-264 663 Div. 2
(TIPSP/GRW) OTS price $14.50

Navy Weather Research Facility, Washington, D. C.
JET STREAMS OF THE ATMOSPHERE.
1961, 213p. incl. illus. 110 refs. (Rept. no. NAVWEPS 50-1P-549)
Unclassified report

DESCRIPTORS: (*Jet streams (Meteorology), Atmosphere, Stratosphere.) (*Climatic factors on Aircraft, Aerial reconnaissance, Northern hemisphere, Atmospheric sounding.)

AD-264 671 Div. 2, 25
(TIPSP/TL) OTS price $3.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY RADIO OBSERVATORY, OWENS VALLEY, CALIFORNIA 1961. 4. BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. I. OBSERVATIONS WITH AN EAST-WEST INTERFEROMETER,
by Alan T. Moffet. 1961, 38p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Radio astronomy, Radio waves, Radio interferometers, *Astronomical observatories, *Radio interference.) (Antennas, Parabolic antennas.) (Temperature, Measurement, Instrumentation, Brightness, Intensity.) (Integral equations, Integrals, Integral transforms, Trigonometry.) (Errors, Tables.)

The Caltech variable baseline interferometer was used in a program of brightness distribution measurements on 195 discrete radio sources at a wavelength of 31.3 cm. This paper reports measurements, made with an east-west interferometer baseline, of the complex visibility functions of 127 sources. The amplitude and phase of the visibility functions were measured at transit with antenna spacings of 195, 389, 779, and 1557 lambda. Using these same basic spacings, and by observing at large hour angles, the visibility amplitude was measured at ten other effective spacings between 126 lambda and 1363 lambda. Not all sources were observed at all spacings. The data are presented in tabular form, and graphs of the visibility amplitude as a function of antenna spacing are given for 51 of the more interesting sources. (Author)

AD-264 672 Div. 2, 25
(TIPSP/TL) OTS price $1.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY RADIO OBSERVATORY, OWENS VALLEY, CALIFORNIA 1961. 5. BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. II. OBSERVATIONS WITH A NORTH-SOUTH INTERFEROMETER,
by P. Maltby. 1961, 20p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Radio interferometers, Antennas, *Astronomical observatories, Integral transforms, Trigonometry.) (Brightness, Aurorae, Intensity, Measurement.) (Errors, Tables.) (Delay lines, Attenuation, Frequency modulation, Instrumentation.) (*Radio astronomy, Radio waves, Ultra high frequency.)

The brightness distribution in 165 radio sources was obtained at a wavelength of 31.3 cm. The measurements were made with the variable spacing interferometer at the Owens Valley Radio Observatory using a north-south baseline. Primary sets of observations, giving the visibility amplitude and the phase, were taken at transit at four different antenna spacings. Additional information about the brightness distribution was obtained from observations at large hour angles, using the same physical antenna separations. The results of the observations are given in tabular form and several visibility curves are shown. (Author)

AD-264 673 Div. 2
(TIPSP/MFA) OTS price $3.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY RADIO OBSERVATORY, OWENS VALLEY, CALIFORNIA 1961. 6. THE RADIO SPECTRUM OF SUPERNOVA REMNANTS,
by D. E. Harris. 1961, 29p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Astronomical observatories, Supernovae, Galaxies, Stars, Surface properties, *Radio astronomy, *Extraterrestrial radio waves, Radio receivers, Particle accelerators.) (Photographic analysis, Photoemission, Photographic plates.) Tables.

960 Mc/s observations of thirteen galactic sources generally assumed to be supernova remnants, are coupled with previous observations at other frequencies to derive spectral indices. Although several values of spectral index are found in the neighborhood of zero, arguments are presented that free-free transitions are not the primary cause of the radio emission. An interpretation of the relatively large range of spectral indices is suggested on the basis of an evolutionary sequence in which young, bright objects with relatively steep spectra gradually evolve into old, faint objects with flat or inverted spectra. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-263 996 Div. 3, 14
(TIPSM/EJH) OTS price $1.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EVALUATION OF FILTER PAPER AND DELRIN PLASTIC AS CASE MATERIALS FOR FLARE AND SIGNAL SYSTEMS,
by Joseph Kristal, Burton Werbel, and Everett D. Crane. Sep 61, 11p. incl. illus. tables.
(Technical notes no. FRL-TN-51)
(Proj. no. 504-22-016)
Unclassified report

DESCRIPTORS: (*Parachute flares, *Rocket flares, Rocket signals, *Flares, *Smoke rockets, *Colored flares, *Pyrotechnics.) (Magnesium, Powder metals, Sodium compounds, Nitrates.) (*Containers, Packaging, Thickness, Materials, *Filter papers, Paper, *Plastics, Combustion, Light, Intensity.)

Static performance tests were conducted on yellow flare compositions loaded in cases having 1.15- and 1.24-inch inner diameters and various wall thicknesses. Results were compared using filter paper, Delrin plastic, and Kraft paper cases. Burning rates were found to be essentially independent of case material. Light intensity was greater with Delrin and filter paper than with Kraft paper. Decreased wall thickness tended to produce increased light output over the range studied. (Author)

AD-264 674 Div. 2
(TIPSP/WH) OTS price $4.60

Cornell U., Ithaca, N. Y.
THE INTERSTELLAR ABUNDANCE OF THE HYDROGEN MOLECULE,
by Robert J. Gould. 31 Aug 61, 42p. incl. illus. tables.
(Contract AF 49(638)915)
(AFOSR-1401) Unclassified report

DESCRIPTORS: (*Abundance of *Hydrogen, Molecules in *Interstellar matter.) (Electron transitions, Interstellar matter, Hydrogen, Gases, Dissociation, Recombination reactions, Cosmic rays, Atomic energy levels.)

The various processes which determine the concentration of molecular hydrogen in HI clouds are investigated. It is shown that, contrary to the results of previous investigations, the processes involving a dissociation of the molecule are quite negligible compared to the relatively rapid formation of H2 on the surfaces of grains. As a result there is a gradual build-up of molecular hydrogen in the clouds until the clouds, thru their random motion, pass near a bright star whereby the H2 is dissociated again. The percentage of hydrogen which should have associated to molecular form is estimated under various conditions. In particular, calculations are made for the case of a constant ratio of gas to dust density and for the case where the dust density is independent of the gas. The results of the calculations vary considerably, depending on the conditions but the general results point to the likelihood of a molecular hydrogen concentration comparable to that of the observed atomic hydrogen and in some circumstances to a value much greater than that of the atomic concentration. (Author)

AD-264 073 Div. 3
(TIPSM/SEB) OTS price $1.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLINGS FOR MUNITIONS.
Quarterly progress rept. 1 Oct-31 Dec 46,
by J. C. Brosheer, F. A. Lenfesty, and P. L. Imes. 31 Dec 46, 9p.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/2)
Unclassified report

DESCRIPTORS: (Chemical warfare agents, Grenades, *Smoke grenades, Munitions, Loading, *Phosphorus.) (Binders, Resins, *Thermosetting resins, Plastics, Preparation, Hardening, Tests.) (Loading, Phosphorus compounds, Sulfides with Ureaformaldehyde resins, Furan resins, Benzaldehydes, Gypsum.)

The study of phosphorus fillings for munitions included investigation of plastics that may be hardened at room temperature. Laboratory preparations of urea-formaldehyde, urea-furfural, furfural-formaldehyde, and furfural-benzaldehyde plastics have been made, and two commercial casting resins have been tested. Preliminary small-scale firing tests have indicated that mixtures of hard plastics and granulated phosphorus have somewhat better burning characteristics than has elemental phosphorus alone. The bursting charge is a critical factor in the performance of a P filling, and it is assumed that it will be necessary to procure or develop a suitable combination of burster and container to obtain the most satisfactory results with a given filling. (Author)

Division 3 - CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-264 074 Div. 3
(TIPSM/SEB) OTS price $1.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLING FOR MUNITIONS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 47,
by J. C. Brosheer, F. A. Lenfesty, and P. L. Imes. 31 Mar 47, 12p. incl. tables.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/3)
Unclassified report

DESCRIPTORS: (Chemical warfare agents, Grenades, *Smoke grenades, Munitions, Loading, *Phosphorus, White phosphorus.) (Binders, Resins, *Thermosetting resins, Hardening, Tests.) (Loading, White phosphorus with Urea formaldehyde resins, Furan resins, Benzaldehydes, Gypsum.)

In a continuation of the study of P fillings for munitions, additional resin binders for granulated white P were tested. Several commercial preparations were found to harden readily at room temperature and to form stable mixtures with granulated P. Tests of commercial resins are being continued. Firing tests have shown that the performance of rigidly solid P fillings is dependent upon the bursting charge. High-brisance bursters invariably fragment the filling excessively with resultant pillaring of the combustion products. Burster charges of a propellant powder produced relatively little fragmentation and little pillaring. (Author)

AD-264 075 Div. 3
(TIPSM/SEB) OTS price $1.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLING FOR MUNITIONS.
Quarterly progress rept. no. 4, 1 Apr-30 June 47,
by J. C. Brosheer, F. A. Lenfesty, and P. L. Imes. 30 June 47, 16p. incl. illus. tables.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/4)
Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Munitions, Grenades, *Smoke grenades, *Phosphorus, *White phosphorus.) (Binders, Resins, *Thermosetting resins, Hardening, Tests.) (Loading, Phosphorus with Urea formaldehyde resins, Furan resins, Benzaldehydes, Gypsum.)

In a continuation of the search for suitable binders for granulated white P in fillings for munitions, several additional commercial casting resins were tested. A test for evaluation of the thermal stability of the experimental fillings in projectiles was devised and used. The method is based on the lateral shift of the center of gravity from the longitudinal axis of the filled projectile when the projectile is stored on its side at 65 C. Of the experimental phosphorus fillings subjected to firing tests, those in which the granulated phosphorus was bound with plaster of Paris were the most promising. Fillings bound with Duralon, Palestic, and Thiokol LP-2 performed fairly well, but fillings bound with phenolic casting resins gave poor smoke screens. Flame retardants, such as are used in permissible explosives to lower the temperature of combustion, appeared in preliminary tests to be worthy of further study as agents for improving the performance of the phosphorus fillings. (Author)

AD-264 076 Div. 3
(TIPSM/SEB) OTS price $2.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLINGS FOR MUNITIONS.
Quarterly progress rept. no. 5, 1 July-30 Sep 47,
by J. C. Brosheer, F. A. Lenfesty, and P. L. Imes. 30 Sep 47, 22p. incl. illus. tables.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/5)
Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Grenades, *Smoke grenades, Loading, *Phosphorus, White phosphorus, Preparation, Processing, Stability, Temperature, Combustion, Tests.) (Phosphorus, *White phosphorus, Particles, Powders, Preparation, Processing, Vapor pressure.) (Binders, Resins, Thermosetting resins, Preparation, Processing.) (Flames, Flame arrestors, Chemicals, Oxalates, Ammonium radicals.)

Plaster of Paris, Duralon, and Thiokol LP-2 are the most promising of the various experimental bbinders. These binders will be used exclusively in immediate further study of fillings based upon granulated P. The present method of measuring the thermal instability of the fillings by determination of the unbalance of a filled munition after storage on its side under desert conditions appears to be satisfactory. Fillings composed of mixtures of red and white P, particularly mixtures that result from substantially complete conversion of white P to massive red P within the munition, appear to be promising. (Author)

AD-264 077 Div. 3
(TIPSM/SEB) OTS price $1.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLINGS FOR MUNITIONS.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 47,
by J. C. Brosheer, F. A. Lenfesty, and P. L. Imes. 31 Dec 47, 10p. incl. tables.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/6) Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Munitions, Grenades, *Smoke grenades, Loading, *Phosphorus, White phosphorus.) (Loading, Binders, Resins, Thermosetting resins, Physical properties, Density, Stability, Temperature, Test methods, Test equipment.) (Loading, Phosphorus, Urea formaldehyde resins, Furan resins, Benzaldehydes, Gypsum.) (Phosphorus, *White phosphorus, Chemical reactions.)

Fillings in which granules of P are cemented with Duralon, Thiokol LP-2, Thiokol LP-2 modified by the addition of SHCH2CH2OH, plaster of Paris, or polyvinyl alcohol-phosphorus emulsions and plaster of Paris appear to be sufficiently stable in thermal stability tests at 65 C. A pendulum-type balance for determining the location of the center of gravity along the axis of a munition has been constructed and used in evaluating the thermal stability of various P fillings. None of the binders appeared to undergo appreciable change during the thermal stability tests. Conversions of white to red P in sealed M15 grenades have been carried out with initial charges that contained about 35% red and 65% white P. The reduction in maximum temperatures, and concomitant pressures, effected by the substitution of red P for a part of the white P charge was much less than was expected, and the work entailed in partial conversion of white to red P before charging into the munition does not appear to be justifiable by the small lowering in temperature that is obtained in the final conversion. (Author)

AD-264 078 Div. 3
(TIPSM/SEB) OTS price $2.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLINGS FOR MUNITIONS.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 48,
by J. C. Brosheer, F. A. Lenfesty and others.
31 Mar 48, 18p. incl. tables.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/7) Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Munitions, *Projectiles, Grenades, *Smoke grenades, Preparation, Processing, Tests.) (Loading, *Phosphorus, Binders, Resins, Stability, Temperature, Physical properties, Density.) (Phosphorus, White phosphorus, Chemical reactions.) (Urea formaldehyde resins, Furan resins.) Gypsum, Phosphorus.

Results of calculations based on data obtained in thermal stability tests of experimental P fillings indicate that the stabilities of the fillings are about as high as can be expected from the properties of the materials comprising the fillings. Conversions of white to red P in 4.2 CM shells have been carried out. When the shells are quenched in water as soon as the conversion reaction is well under way, the conversion proceeds smoothly and safely to completion. The silver-soldered M2A shells will not stand the conditions imposed, 600 psi at 560 C., when the shells are allowed to remain in the furnace throughout the conversion. Ninety-six 4.2 CM shells have been filled with experimental P fillings. Of these, 2 were tested to destruction in the conversion of white P to massive red P. The other 94 shells have been sent to the Army Chemical Center for test. (Author)

AD-264 079 Div. 3
(TIPSM/SEB) OTS price $2.60

Tennessee Valley Authority, Wilson Dam, Ala.
PHOSPHORUS FILLINGS FOR MUNITIONS.
Summary rept. 1 July 46-31 Mar 48,
by J. C. Brosheer, F. A. Lenfesty and others.
31 Mar 48, 18p.
(Contract W18-035-CWS-1318)
(Rept. no. ETF 153.5-2/8) Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Munitions, *Grenades, *Smoke grenades, Loading, Phosphorus, Binders, Preparation, Processing, Specifications, Tests.) (*Phosphorus, White phosphorus, Powders, Particles, Preparation, Processing, Chemical reactions.) (Binders, Resins, Thermosetting resins, Preparation, Tests.) (Loading, Phosphorus, Urea formaldehyde resins, Furan resins, Gypsum.)

In experiments on modification of the physical properties of the P fillings, a procedure was developed for conversion of white P to red P in the munition itself. The resultant massive red P filling is very stable ballistically, but it ignites and burns somewhat less rapidly than is desirable. Most of the work done concerned mixtures of granulated white P and fluid binders which set to solid masses at room temperature. Attempts to prepare suitable binders from laboratory reagents were unsuccessful, but several commercial products appeared to be satisfactory. A method of producing white P granules of suitable particle size was developed in the course of the work. The experimental fillings were charged into M15 grenades for preliminary tests. The performance of the fillings was evaluated in firing tests under simulated service conditions. A thermal stability test was developed and used to measure the effect of storage at high temperatures on the ballistic stability of the fillings. (Author)

AD-264 083 Div. 3
(TIPSM/REB) OTS price $1.60

ORDWES Lab., Wesleyan U., Windsor Locks, Conn.
OXIDANT-FUEL COMPOSITIONS FOR VAPORIZABLE AGENTS.
Monthly progress rept. no. 2 for 31 July 52,
by W. Plaskonos. 31 July 52, 17p. incl. illus.
(Rept. no. CML 1952-2)
(Contract DA 18-108-cml-3630)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Smokes, (Incendiary mixtures, Vapors, Fuels, Oxidizers, Scattering, Combustion, Pressure, Temperature, Tests.) (Oxidizers, Potassium compounds, Chlorates.) (Fuels, Sucrose.) (Incendiary mixtures, Acetamides, Anthracenes, Quinones.)

Ternary systems have been employed to study the dispersing effect of fuel-oxidant combinations in pyrotechnic mixtures. Acetamide, anthracene, anthraquinone and methylaminoanthraquinone, all used with potassium chlorate and sucrose, are discussed. (Author)

AD-264 088 Div. 3, 30
(TIPSE/NTM) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 2, 1-31 Aug 52,
by William Hecox, Thomas M. Boland and others.
12 Sep 52, 18p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (*Liquid level control, *Liquid level gages.) (Rockets, Chemical bonds, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.) Flowmeters.

Literature received to date from manufacturers of items that may be useful in munition-filling systems is reviewed. Most of this literature relates to filling machines, flowmeters, valves, and liquid-level indicators. Six methods of accomplishing volumetric filling of shells, rockets, and bombs are disclosed, together with block diagrams illustrating each system. The advantages and limitations of these systems are presented. Two liquid flowmeters of commercial manufacture are described also. (Author)

AD-264 089 Div. 3, 30
(TIPSE/NTM) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 3,
by Thomas M. Boland, William Hecox, and others.
30 Sep 52, 17p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: *Liquid level control, Liquid level gages. (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.)

An art-type search was conducted of the patent literature dealing with items that may be incorporated into a munitions-filling system. The

results of this search are reviewed. A considerable number of patents on constant-volume filling machines and liquid-level indicators were discovered. Further technical information on system components was received also. The selection of a system which appears most suitable for volume filling of shells, rockets, and bombs has been made. This system, which weighs the desired amount of liquid in an intermediate chamber, is described. The components section includes a description of four components, three of which are embodied in the selected weigh-type system. (Author)

AD-264 090 Div. 3, 30
(TIPSE/NTM) OTS price $1.10

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 6, 1-31 Dec 52, by Thomas M. Boland, William Hecox, and others. 31 Dec 52, 4p.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (*Liquid level control, *Liquid level gages.) (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.)

The basic construction of the filling system that weighs the desired amount of liquid in an intermediate chamber is completed, except for the automatic-sequencing control equipment. Initial tests have been made of this system, and overfilling results. To remove this undesirable effect, modification of the servo system and valve-operating mechanism is necessary. Several such modifications are proposed and are, or will be, effected. (Author)

AD-264 091 Div. 3, 30
(TIPSE/NTM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 7, 2-30 Jan 53, by Thomas M. Boland, William Hecox, and others. 30 Jan 53. 8p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.) (*Liquid level control, *Liquid level gages, Automatic.)

The sequencing control equipment was constructed and installed in the constant-volume munition-filling device. This circuit provides automatic control of the entire filling-operation cycle. The servomotor drive that operates the Annin valve was modified, and its performance improved. The servomotor, gearbox, and rate generator have been mounted into a compact unit, providing precision operation and sturdy construction. Late delivery of Annin valve seats and plugs have delayed further tests of the entire munition-filling system. A preliminary model of the release valve for the weigh chamber was built; however, certain design improvements are necessary on this device. (Author)

AD-264 092 Div. 3, 30
(TIPSE/NTM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 8, 2-27 Feb 53, by Thomas M. Boland, William H. Peake, and others. 27 Feb 53, 14p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions, Ultrasonics.) *Liquid level control.

A preliminary analysis of the use of sonic or ultrasonic techniques for the determination of munition-cavity volume is presented. Results of this analysis indicate that a device of this type may be suitable as a check for volume measurements of both empty and filled munitions. Preliminary calculations pertaining to a 2600-ml shell volume are included. A method of compensation for variations in the specific gravity of the liquid agent is proposed. This device would add or subtract weight to or from the balance arm by a chain attached to the counterweight outrider. Remote control would be provided for the chain-adjusting mechanism. Further improvements toward better Annin valve performance have also been made during February. (Author)

AD-264 093 Div. 3, 30
(TIPSE/NTM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 9, 2-31 Mar 53, by Thomas M. Boland, William Hecox, and others. 31 Mar 53, 8p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (*Liquid level control, *Liquid level gages.) (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.)

The latest improvements added to the weigh filler are described. These involve a rate circuit, and also a device which positions leaf springs so that they engage the shadograph lever arm as it moves away from balance. Tests of the filling system made following the addition of these improvements showed that its accuracy was better than one per cent for 500-gram fill and also for 1000-gram fill. Results of these checks are included. Drawings of the redesigned chamber release valve are presented. (Author)

AD-264 094 Div. 3, 30
(TIPSE/NTM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND

LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 10, 1-30 Apr 53, by Thomas M. Boland, William Hecox, and others. 1 May 53, 9p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (*Liquid level control, *Liquid level gages.) (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Measurement, Volume, Munitions.) Ultrasonics, Electrical conductance.

Consideration was given to three liquid-control systems of filling munitions to a given level. Two of these systems employ ultrasonic techniques, and the third, an electrical-conductance probe. The system incorporating the conductance probe has been selected for construction and development at Battelle. A description and drawing of the improved Annin-valve-drive mechanism is also presented. (Author)

AD-264 095 Div. 3, 30
(TIPSE/NTM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY AND EVALUATION OF LIQUID-LEVEL AND LIQUID-VOLUME CONTROLS FOR SHELL-, ROCKET-, AND BOMB-FILLING MACHINES.
Monthly progress rept. no. 11, 1-31 May 53, by Thomas M. Boland, William Hecox and others. 1 June 53, 8p. incl. illus.
(Contract DA 18-108-cml-3965)
Unclassified report

DESCRIPTORS: (Rockets, Chemical bombs, Chemical projectiles, Loading.) (Machines, Loading, Munitions, Chemical warfare agents.) (Liquid level control, Chemical warfare agents, Valves, Fluid flow.) (*Liquid level control, *Liquid level gages.)

Accuracy tests on the improved weigh filler were run, and the results proved very favorable. For 500-gram fill weights, the maximum error was 0.3 per cent; for 1000-gram fill weights, 0.35 per cent. A device for specific-gravity compensation was built and installed on the weigh filler. Its operation is satisfactory. Progress on the liquid-level filling control includes construction of a flow system with suitable valve-control circuits and the design of a probe head to detect the agent level during filling. (Author)

AD-264 098 Div. 3
(TIPSM/REB) OTS price $1.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 1 for Feb 49 on Incendiary Research PT-1 Incendiary Mixtures, by O. O. Kenworthy, J. F. Uher, and A. W. Locuoco. Feb 49, 9p. 45 refs.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Powder metals, Magnesium compounds, Production, Processing.)

Investigations were initiated of various processes for the production of a magnesium paste or equivalent which, when mixed with ingredients used in the formulation of PT1 incendiary mixture, will be comparable with mixtures prepared from the Paste, Magnesium Dust, CWS Specification 196-131-245 dated 23 June 1944, Amendment No. 1, 4 September 1944. Efforts during this period have been limited to review of literature, conferences, procurement of supplies and equipping the laboratory, preparatory to experimental work. The literature has been abstracted for ready reference. Sources of magnesium powder have been located and experimental lots have been ordered. (Author)

AD-264 099 Div. 3
(TIPSM/REB) OTS price $1.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 2 for Mar 49 on Incendiary Research PT-1 Incendiary Mixtures, by O. O. Kenworthy, J. F. Uher, and W. A. Locuoco. Mar 49, 8p. incl. table.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Powder metals, Metalorganic compounds, Magnesium compounds, Ethanols, Production, Processing.) (*Fuel thickeners, Synthetic rubber, Polymers, Butadienes.) (Powder metals, Coatings, Asphalt, Petroleum, Oils.)

Preliminary work has been performed on various asphalts, gasoline thickeners, metallic powders and organo-magnesium compounds. This work is leading to general ideas, without conclusions, pending the collection of actual burning and consistency data. The use of Vistanex compounds and polybutadiene shows promise as a probable substitute for I. M. Polymer as gasoline thickeners. It appears evident that metals of 100 mesh or finer will prove adequate for goop mixes. The organo-magnesium compounds are showing some promise. (Author)

AD-264 100 Div. 3
(TIPSM/EJH) OTS price $6.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 4 on Incendiary Research PT-1 Incendiary Mixtures, by O. O. Kenworthy, J. F. Uher, and A. W. Locuoco. May 49, 69p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Polymers, Butyl radicals, Methyl radicals, Acrylic resins, Butenes, Plastics, Magnesium, Powder metals, Magnesium compounds, Carbonates, Carbon black, Coatings, Plasticizers, Asphalt, Kerosene, Sodium compounds, Nitrates, Fuel thickeners, Additives, Gasoline, Gels.) (*Pyrotechnics, Manufacturing methods, Processing, Mechanical properties, Elasticity, Combustion, Pyrolysis, Test methods, Test equipment.)

Synthetic goops using as vehicles the various asphaltic compounds with kerosene and gasoline, were prepared. The solid material used, in general, was a mixture of 50% Mg metal, 30% $MgCO_3$ and 20% carbon black. Various ratios between asphalt and kerosene were tried with best results

obtainable as percentage of kerosene was increased. Each goop was further compounded into a PT mix using the following standard ingredients: coarse Mg; $NaNO_3$; gasoline; petroleum oil extract; and gelled gasoline. These mixes were checked for burning time and were submitted to Torsiometer tests after storage for 5-12 hours at 77 + or - 3 F. Pyrometer burning data were obtained on all samples. Work was continued on the use of Vistanex compounds as a substitute for I.M. Polymer. Results do not lend much encouragement, as the elasticities obtained were extremely low. (Author)

AD-264 101 Div. 3
(TIPSM/EJH) OTS price $7.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 3 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and A. W. Locuoco. Apr 49, 71p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Magnesium, Powder metals, Coatings, Plasticizers, Asphalt, Kerosene, Petroleum, Sodium compounds, Nitrates, Fuel thickeners, Additives, Polymers, Butyl radicals, Methyl radicals, Acrylic resins, Gasoline, Gels.) (*Pyrotechnics, Manufacturing methods, Processing, Mechanical properties, Elasticity, Combustion, Pyrolysis, Test methods, Test equipment.) Torsion meters.

A pyrometer test chamber was constructed. Three lots of I.M. Polymer have been received from different sources. Samples of each lot were heat treated at 80 C for 1, 2, 3, and 4 hr. PT mixes, using Type C goop, were made with each sample. Each PT mix was tested on the CWS Torsiometer, checked for burning time, and fired in the pyrometer test chamber. A 50-50 mixture of lots 465 and EA, heat treated for 2 hr at 80 C was selected as standard. Preliminary 100 gm samples of PT mixes were made using the various coating materials along with Granulation 16 (JAN-M-382) Mg powder. Results obtained so far on this line of attack are encouraging. (Author)

AD-264 102 Div. 3
(TIPSM/EJH) OTS price $8.10

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 5 on Research Pt-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and A. W. Locuoco. June 49, 82p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Magnesium, Powder metals, Magnesium compounds, Oxides, Hydroxides, Coatings, Plasticizers, Sodium compounds, Nitrates, Additives, Fuel thickeners, Polymers, Butyl radicals, Methyl radicals, Acrylic resins, Gasoline, Gels.) (*Pyrotechnics, Manufacturing methods, Mechanical properties, Elasticity, Combustion, Pyrolysis, Test methods, Test equipment.)

Synthetic goops were made so that each goop could be further compounded into a PT mix using standard weight ingredients: 100 gm coarse Mg; 45 gm $NaNO_3$; 35 gm gasoline; 30 gm petroleum oil extract; and 310 gm gelled gasoline. The synthetic goops prepared during the past month have shown very encouraging results. Sovaloid W and Carter asphalt appear to be best suited as vehicles. The use of MgO, together with either of the above vehicles, gives much better results than $MgCO_3$. It was possible to produce a PT mix, using a synthetic goop containing MgO, that falls in the range of all applicable specifications. (Author)

AD-264 103 Div. 3
(TIPSM/EJH) OTS price $8.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 6 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher and others.
July 49, 92p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Magnesium, Powder metals, Magnesium compounds, Oxides, Carbonates, Carbon black, Coatings, Plasticizers, Asphalt, Sodium compounds, Nitrates, Fuel thickeners, Additives, Polymers, Acrylic resins, Gasoline, Gels.) (*Pyrotechnics, Storage, Manufacturing methods, Mechanical properties, Elasticity, Combustion, Pyrolysis, Test methods, Test equipment.)

Small additions of sulfur, calcium oxide and calcium carbide were investigated to determine their effect on synthetic goop. Various particle sizes of powdered coal were tried as a replacement for carbon black. Magnesium hydroxide was further investigated. A few attempts were made to produce a synthetic goop with a minimum of inert or non-combustible ingredients giving encouraging results. Ten additional trials of the acceptable goop reported last month produced average results within the specification limits. PT mix made from this goop after two weeks storage showed low consistency readings. Various goops were prepared using Mg, $MgCO_3$, carbon black and various asphalts. Substitution of MgO for most of the $MgCO_3$, with Sovaliod W as the vehicle, has produced a PT mix that meets all applicable specifications. Results of the current month indicate that this mix can be duplicated. However, lower consistency readings are obtained if the goop is stored two weeks prior to preparation of PT mix. (Author)

AD-264 104 Div. 3
(TIPSM/EJH) OTS price $8.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 7 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish. Aug 49, 100p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Magnesium, Powder metals, Magnesium compounds, Oxides,

Carbon black, Coatings, Plasticizers, Asphalt, Kerosene, Sodium compounds, Nitrates, Fuel thickeners, Additives, Polymers, Acrylic resins, Gasoline, Gels.) (*Pyrotechnics, Storage, Manufacturing methods, Mechanical properties, Elasticity, Combustion, Pyrolysis, Test methods, Test equipment.)

Numerous trials were run in an effort to produce a synthetic goop with a minimum of inert or noncombustible ingredients. No difficulty was encountered in producing adequate consistency, however, the elasticity has always remained under 200 degrees. Within these simplified goops there appears to be little difference produced from various grades of magnesium. Various grades of magnesium hydroxide were tried as replacements for magnesium oxide. Magnesium oxide gives higher elasticity and consistency readings. The effects of sulfur, calcium oxide and calcium carbide in synthetic goops have been further investigated. (Author)

AD-264 105 Div. 3
(TIPSM/EJH) OTS price $9.60

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 8 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish.
Sep 49, 112p. incl. illus, tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Materials, Mixtures, Magnesium, Magnesium compounds, Oxides, Carbon black, Coatings, Plasticizers, Asphalt, Kerosene, Sodium compounds, Nitrates, Fuel thickeners, Additives, Polymers, Acrylic resins, Gasoline, Gels.) (*Pyrotechnics, Storage, Manufacturing methods, Elasticity, Mechanical properties, Combustion, Pyrolysis, Test methods, Test equipment.)

Some variations in PT mix formulations were examined using the satisfactory goop reported last month. These variations did not prove beneficial. Several trials were run with variations of mixing times of both goop and resultant PT mix. No difference was apparent or could be atributed to the mixing operation. The use of methacrylic acid, as an aid toward soap preparation, has been tried with little or no effect. Considerable effort has been and is being expended toward the establishment of specification standards on all raw materials used in the synthetic goops. (Author)

AD-264 106 Div. 3
(TIPSM/REB) OTS price $8.10

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 9 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish.
Oct 49, 82p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Magnesium compounds, Oxides, Production, Processing, Elasticity, Determination, Tests, Torsion meters, Pyrometers.) (*Fuel thickeners, Materials.)

Bulking values of the solid ingredients were determined. The effect of these values in the preparation of synthetic pastes was investigated. Some correlation is evident, however the effect seems to be more dependent upon the material used than on its bulking value. The possibility of producing a paste with a minimum number of ingredients has been investigated and appears feasible. Presence of magnesium oxide is necessary to produce adequate torsiometer readings. Synthetic pastes are calculated on the basis of a total weight of 490 grams. Slight variations of the standard ingredients were examined during the past month. Increase in $NaNO_3$ at the expense of either gasoline or petroleum oil extract tends to lower burning times. Ten gallons of a satisfactory paste formulation were prepared. (Author)

AD-264 107 Div. 3
(TIPSM/REB) OTS price $9.10

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 10 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish. Nov 49, 101p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Magnesium compounds, Oxides, Production, Processing, Storage, Elasticity, Temperature, Determination, Tests, Torsion meters, Pyrometers.) (Magnesium compounds, Oxides, Effectiveness, Adsorption, Determination.) (*Fuel thickeners, Materials.)

Iodine numbers were determined on magnesium oxides from several sources as a measure of the adsorptive activity of magnesium oxide. Magnesium oxides from several sources were tried in 2 separate synthetic goop formulations. Increasing iodine number and increasing bulking value produced increasing consistency readings. Additional studies were made on storage effects. Temperatures at which the torsiometer readings are taken have a marked inverse effect on the consistency. This seems to be true even though the change in temperature is small. The presence of carbon black in the synthetic mix appears to have an adverse effect during storage. The effect of magnesium carbonate has been studied. Addition of magnesium carbonate tends to shorten the burning time of the synthetic mix. (Author)

AD-264 108 Div. 3
(TIPSM/REB) OTS price $9.10

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 11 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish.
Dec 49. 104p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Magnesium compounds, Oxides, Production, Processing, Elasticity, Determination, Tests, Torsion meters, Pyrometers.) (*Fuel thickeners, Materials.)

Considerable effort was spent in preparation of large batches of paste and laboratory experimentation on these pastes. Some discrepancy was noted in the transfer of laboratory paste formulae to pilot plant operations. The effect of past temperature on resultant torsiometer readings of PT mix was studied. Gilsonite was tested as a probable substitute for Sovaloid W. Lead-free gasoline, Blue Sunoco, was compared with leaded gasoline, Sohio X70. The iodine number, adsorptive activity, of the magnesium oxides continues to play an important part in the formulation of PT mixes. Attempts were made to lower the amount of magnesium oxide in the paste. Author)

AD-264 109 Div. 3
(TIPSM/REB) OTS price $8.10

Ferro Corp., Cleveland, Ohio.
AN INVESTIGATION OF MAGNESIUM PASTES FOR USE IN INCENDIARY MIXTURES.
Monthly rept. no. 12 on Incendiary Research PT-1 Incendiary Mixtures,
by O. O. Kenworthy, J. F. Uher, and L. A. Pavlish.
Jan 50, 82p. incl. illus. tables.
(Contract W18-108-cm-1049)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Incendiary mixtures, Magnesium, Magnesium compounds, Oxides, Production, Processing, Elasticity, Determination, Tests, Torsion meters, Pyrometers.) (Magnesium compounds, Oxides, Adsorption, Elasticity.) (*Fuel thickeners, Materials.)

An attempt was made to correlate the relationship of iodine number to Torsiometer readings. The use of a magnesium oxide with high iodine number, adsorptive activity, in smaller quantities was investigated. Results of this investigation led to the selection of three formulations for processing, each of which contained a different magnesium oxide. Paste J-431 uses Permanente magnesium oxide; Paste J446 uses General Magnesite and Magnesia magnesium oxide; and Paste J447 uses Merck Special Light magnesium oxide. (Author)

AD-264 113 Div. 3, 4
(TIPSM/EJH) OTS price $1.10

Notre Dame U., Ind.
CWS PROJECT.
Progress rept. for 15 Nov 47,
by Charles C. Price. 15 Nov 47, 8p.
(Contract W 18-035-CWS-1312)
Unclassified report

DESCRIPTORS: (Methyl radicals, Alkoxy radicals, Chlorine compounds, *Silanes.) (Methyl radicals, Alkoxy radicals, Fluorides, *Silanes.) (Methyl radicals, Amines, *Phosphorus compounds, Chlorides.) (Methyl radicals, Amines, Cyano radicals, Phosphorus compounds, Chlorides.) (Methyl radicals, *Phosphorus compounds, *Fluorides.) (Methyl radicals, Chlorine compounds, *Phosphines.) (Methyl radicals, *Phosphites.) (*G agents, *Chemical warfare agents, Detection, Chemical analysis, Chemical indicators, Indoles, Peroxides, Test equipment, *Fluorometers, Sensitivity.) Chemical reactions, Synthesis.

Diethylisopropoxyfluorosilane showed some neurotoxic symptoms, so it was planned to prepare the dimethyl and diisopropyl analogs. A sample of what was probably dimethylisopropoxyfluorosilane showed signs of changing rapidly on contact with air. Work initiated on the diisopropyl analog was abandoned for work on the preparation of methylphosphorus dichloride. Some intermediates in the projected synthesis of dimethylaminocyanophosphoryl fluoride are reported and dimethylaminophosphoryl difluoride, which showed signs of G activity, was prepared. An investigation of the rearrangement of dimethyl and trimethyl phosphites was begun. (Author)

AD-264 114 Div. 3, 4
(TIPSM/EJH) OTS price $1.10

Notre Dame U., Ind.
CWS PROJECT.
Progress rept. for 15 Mar 47,
by Charles C. Price. 15 Mar 47, 5p.
(Contract W 18-035-CWS-1312)
Unclassified report

DESCRIPTORS: (Ethyl radicals, Alkoxy radicals, *Silicon compounds, Synthesis, Chemical reactions, Condensation reactions, Physical properties.) (*Phosphorus compounds, *Chlorides, Ethyl radicals, Silicon compounds, *Fluorides, Chemical reactions.) (*Chemical warfare agents, *G agents.) (Ethyl radicals, *Silicon compounds, Chlorides, *Fluorination, Metallic compounds, Chromium compounds, Cadmium compounds, Beryllium compounds, Fluorides.) (Methyl radicals, Ethanols, Amines, *Phosphorus compounds, Chemical reactions with Oxychlorides, Chlorides.) Metal-organic compounds.

Diethyldiisopropoxysilicon and diethylisopropoxysilicon chloride were prepared. Further efforts were made to identify the liquid and the solid products from the reaction of N-methylethanolamine with phosphorus oxychloride. A hygroscopic solid was obtained as the product of the reaction of N-methylethanolamine with phosphorus trichloride. (Author)

AD-264 116 Div. 3, 4
(TIPSM/EJH) OTS price $15.50

Notre Dame U., Ind.
ORGANIC PHOSPHORUS COMPOUNDS.
Summary rept. for 15 Aug 49,
by J. R. Costello and C. C. Price. 15 Aug 49,
235p. 1454 refs.
(Contract W 18-035-CWS-1312)
Unclassified report

DESCRIPTORS: (*Chemical warfare agents, *Phosphorus compounds, *Bibliography.) (Alkyl radicals, Methyl radicals, Ethyl radicals, Propyl radicals, Glycerols, Butyl radicals, Sucrose, *Phosphates.) (Alkyl radicals, Methyl radicals, Ethyl radicals, Thio radicals, *Phosphates.) (Alkyl radicals, Methyl radicals, Ethyl radicals, *Phosphites.) (Alkyl radicals, Methyl radicals, Ethyl radicals, Phosphites.) (Alkyl radicals, Benzyl radicals, Phenyl radicals, Phosphonium radicals, Halides.) (Phosphines, Oxides, Sulfides, Selenides.) (Alkyl radicals, Phosphates, Phosphites.) (*Phosphorus compounds, Amides.) (Alkyl radicals, *Phosphonic acids.)

A literature survey was made of organic phosphorus compounds listed in Beilstein, Chemical Abstracts, and Centralblatt through part of 1948. The material is arranged in the following order:

phosphates, thiophosphates, phosphites, phosphines, phosphine oxides, polyphosphates and polyphosphites, metaphosphates, hypophosphates and hypophosphites, phosphorus amides, phosphonites, phosphonates, phosphinites, and phosphinates. The report is concerned principally with aliphatic, rather than aromatic phosphorus derivatives. (Author)

AD-264 182 Div. 3
(TIPSB/MS) OTS price $6.60

Booz-Allen Applied Research, Inc., Bethesda, Md.
BAARINC-PRO-IR-16.
Quarterly interim rept. no. 16, 1 May-31 July 61.
31 July 61, 64p. incl. illus. tables.
(Contract DA 18-064-404-cml-206)
Unclassified report

DESCRIPTORS: (*Biological warfare, *Aerobiology, *Mathematical analysis.) (*Biological bombs, *Aerosols, Dosage, Meteorological data, Wind, Mathematical prediction of Infections, Casualties.)

MATHEMATICAL MODELS USED IN PREDICTION OF WEAPONS-SYSTEM EFFECTIVENESS: A critical review and an extension of the various predictive equations that are used to guide munition-design engineers in achieving desired area/dosage requirements and similar objectives. CRITICAL REVIEW OF AEROBIOLOGICAL AND INFECTIVITY DATA: A critical review of all available aerobiological and infectivity data, to develop from the totality of such information general hypotheses and mathematical models concerning the physical and biological behavior of biological aerosols, and to recommend areas of investigation and methods of analysis that are likely to lead to useful hypotheses and models. (Author)

AD-264 279 Div. 3
(TIPSB/MS) OTS price $1.60

Naval Ammunition Depot, Crane, Ind.
DEVELOPMENT OF THE EX 33 MOD 0 MARINE LOCATION MARKER,
by E. H. Mason. 14 Sep 61, 12p. incl. illus. table.
(NAVWEPS rept. no. 5487)
Unclassified report

DESCRIPTORS: (*Markers, *Pyrotechnics, Colored smokes, Colored flares, Military requirements, Design, Tests.)

Development work has been completed on the Ex 33 Mod 0 Marine Location Marker. This marker is intended for use with the EX 28 Drill Limpet being developed under Contract NOrd 18275. The EX 28 Drill Limpet is intended for UDT use in training exercises against surface vessels. The Ex 33 Marine Location Marker provides a visual surface indication, either day or night, of the functioning of the drill limpet. The Ex 33 Mod 0 Marine Location Marker produces a green smoke of one minute duration followed by a green flare of one minute duration. A delay is incorporated in the marker to allow time for surfacing of the containing vehicle. This marker has withstood safety handling and environmental evaluation testing. (Author)

AD-264 698 Div. 3, 28, 16
(TIPSM/REB) OTS price $1.10

Hazleton Labs., Falls Church, Va.
(No title).
Progress rept. no. 16.
10 Oct 61, 6p.
(Contract DA 18-108-405-cml-826)
Unclassified report

DESCRIPTORS: (*Chemical warfare agents, Dosage, Conditioned reflex, Exercise, Visual perception, Laboratory animals, Cats, Dogs, Mammals.) (Skin, Penetration.) (Pharmacology, Rats, Dogs, Primates.) (Behavior, Primates.)

4. CHEMISTRY

AD-263 946 Div. 4
(TIPSM/SEB) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
EQUILIBRIA STUDIES.
Final rept., 1 Sep 60-31 Aug 61,
by Frank J. Miraglia, Jr. and Donald F. Othmer.
20 Sep 61, 34p. incl. illus. tables.
(Contract DA 18-108-405-cml-854)
Unclassified report

DESCRIPTORS: (*Octanes, Methyl radicals, Phenyl radicals, Hydroxides.) (Condensation reactions with Ethyl radicals, Esters of *Carboxylic acids, Cyclohexanones, Methyl radicals.) (*Chemical equilibrium, Solubility, Viscosity, Density, Vapor pressure, Physical properties.)

The solubility, viscosity, density, and vapor pressure were determined for 2-(3,5-dihydroxyphenyl)-3-methyloctane (I), ethyl 5-methylcyclohexanone 2-carboxylate (II), and the condensation product of I and II. Test methods and equipment are also described.

AD-263 953 Div. 4
(TIPSM/EJH) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THE OXYGEN ELECTRODE IN FUSED ELECTROLYTES,
by George J. Janz and Fumihiko Saegusa. Sep 61,
8p. illus. table (Technical rept. no. 13)
(Contract Nonr-59110)
Unclassified report

DESCRIPTORS: (*Electrolytic cells, High temperature research, *Electrodes, Platinum, Gold, *Oxygen electrodes, Electrolytes, Melting, Salts, Mixtures, Lithium compounds, Potassium compounds, Sodium compounds, Electrolysis, Electrochemistry, Chemical reactions, Reproduction.) (Electrodes, Platinum, Gold, Oxygen electrodes, Chemical reactions, Surfaces, Coatings, Microstructure, Electric potential, Polarization.) Theory.

The Pt/O2 electrode system is evaluated in a molten carbonate electrolyte at 600 - 800 C by the criteria for reference electrodes. This electrode system is found to be stable and reproducible (+ or - 5 mv) and shows a high degree of reversibility by the criteria of bias-potentials, micropolarization, and the Nernst Equation. It is apparent that this electrode

system functions as a relative of the metal-metal oxide class of reference electrodes. Some results are also reported for gold, rather than platinum, as the metal substrate. While the Au/02 system satisfies the above criteria for reference electrodes, there is evidence that it equilibrates at an energy state slightly higher in thermodynamic free energy than the Pt/02 system. (Author)

AD-263 993 Div. 4, 25
(TIPSM/EJH) OTS price $1.10

University Coll., Dublin (Eire).
(No title).
Annual rept. no. 2,
by D. A. Brown, H. Sloan and others. 1961,
9p. incl. illus. tables.
(Contract N62558-2381, Proj. NR-051-417)
Unclassified report

DESCRIPTORS: (*Anilines, *Chromium compounds, Carbonyl radicals, *Toluidines, *Complex compounds, *Metalorganic compounds, Chemical bonds, Infrared spectroscopy.) (Methyl radicals, Anilines, Chromium compounds, Carbonyl radicals, Organic solvents, Acids, Decomposition.) (Complex compounds, Metalorganic compounds, Anilines, Molecular structure, Theory.) (*Terpenes, *Molybdenum compounds, Carbonyl radicals, Synthesis, Dipole moments, Spectrographic analysis, Molecular structure.) (Phenyl radicals, Cyclopentanones, Chromium compounds, Carbonyl radicals, Chemical reactions, Synthesis, Hydrates.)

Determinations of the N-H stretching frequencies of aniline, aniline chromium tricarbonyl, and p-toluidine chromium tricarbonyl were repeated. pK sub a values of the para-substituted anilines and N,N-dimethyl anilines were determined in 50% aqueous ethanol. Rapid decomposition of aniline chromium tricarbonyl occurred in acid solution; however, measurements were made at various acid concentrations and the results extrapolated to zero acid concentration. An equation for the theoretical calculations of an aniline complex was developed for computer application. Preparation of complexes of the type (arene)Cr(CO)3 is discussed. Azulene dimolybdenum hexacarbonyl was prepared by the reaction between azulene molybdenum hexacarbonyl in petroleum ether under N. Results of the dipole measurement lend support to a cis arrangement of the MO(CO)3 groups. The reaction between tetracyclone and chromium hexacarbonyl is discussed in connection with a novel hydration product.

AD-264 110 Div. 4, 22
(TIPSM/EJH) OTS price $1.60

Frankford Arsenal, Philadelphia, Pa.
DETERMINATION OF OXAMIDE IN NITROCELLULOSE-BASE PROPELLANTS,
by Julius H. Apatoff and Joseph Cohen. July 61,
17p. incl. illus. tables (Test rept. no. T62-1-1)
Unclassified report

DESCRIPTORS: (*Nitrocellulose, *Propellants, Oxalic acids, Amides, Chemical analysis.) (*Oxyalic acids, *Amides, Solvent extraction, Hydrolysis, Titration, Determination.) (Solutions, Sodium compounds, Hydroxides.)

A rapid and accurate method for the determination of oxamide in propellants is proposed. The method is based on the hydrolysis of oxamide in alkaline medium, yielding oxalic acid and ammonia. The propellant, after preliminary solvent extraction, is steam distilled from a ten per cent aqueous sodium hydroxide solution. The liberated ammonia is trapped in a receiver containing an excess of standard hydrochloric acid. The excess acid is then back titrated with standard alkali and the oxamide calculated on the basis that one mole of oxamide yields two moles of ammonia. (Author)

AD-264 111 Div. 4
(TIPSM/EJH) OTS price $4.60

Fordham U., New York.
NUCLEOPHILIC REACTIONS OF SEMIIONIC OXYGEN. II. A NOVEL PREPARATION OF ETHYL GLYOXYLATE FROM ETHYL BROMOACETATE AND DIMETHYL SULFOXIDE. THE STOICHIOMETRY AND THE SULFUR-CONTAINING BY-PRODUCTS.
Technical status rept. no. 11, pt. 6, 1 Mar-31 May 59,
by Jack M. Tien and I. Moyer Hunsberger.
31 May 59, 44p.
(Contract AF 18(603)127)
(AFOSR TN 59-570) Unclassified report

DESCRIPTORS: (Ethyl radicals, *Glyoxylic acid, Esters, Synthesis, Preparation.) (Methyl radicals, *Sulfoxides, Chemical reactions with Ethyl radicals, *Bromides, Acetates.) (Oxygen, Ions.) Displacement reactions, Oxidation, Reduction, Oxidation-reduction reactions, Reaction kinetics, Halogen compounds, Halides.

The reaction of excess dimethyl sulfoxide with ethyl bromoacetate produced ethyl glyoxylate, hydrogen bromide, and dimethyl sulfide. A convenient preparation of ethyl glyoxylate in yields averaging 70% was developed. The generality of the dimethyl sulfoxide oxidation was demonstrated by applying it to a variety of alpha-halogenated acids and esters. An ionic mechanism for this oxidation is suggested which involves nucleophilic displacement of the halogen by the sulfoxide oxygen. A number of earlier-reported reactions of sulfoxides also appear to depend on the nucleophilic nature of their oxygen atoms. It is suggested that other compounds containing semiionic oxygen will exhibit analogous reactions. (Author)

AD-264 184 Div. 4
(TIPSM/SEB) OTS price $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
(No title).
Final rept.,
by Harden M. McConnell. 19 June 61, 3p. 37 refs.
(Contract DA 04-495-ORD-988)
(AROD rept. no. 2234:19) Unclassified report

DESCRIPTORS: (*Bibliography of *Scientific reports, Scientific personnel of Universities on Radiation effects, Molecular structure, Atomic structure, Hyperfine structure, Molecular rotation, Paramagnetic resonance, Electron mass, Nuclear resonance, Nuclear spins, Molecular spectroscopy, Spectrographic analysis of Organic compounds, Isotopes, Free radicals.)

A list of all journal publications that have been supported in part or completely by Contract DA-04-495-ORD-988 is given. (Author)

AD-264 250 Div. 4, 14
(TIPSM/EJH) OTS price $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
POLYPERESTER-INITIATED GRAFT POLYMERIZATION,
by Gerhardt Platau and Robert J. Zeitlin.
May 61, 22p. incl. illus. tables, 11 refs.
(USASRDL Technical rept. 2204)
Unclassified report

DESCRIPTORS: (*Meteorological balloons, Balloons, Materials, Polymers, *Elastomers.) (*Polymers, Methyl radicals, *Acrylic resins.) (*Polymers, Acrylic resins, Chlorides.) (*Polymers, Butyl radicals, *Acrylic resins.) (*Acrylic resins, *Styrenes.) (Polymers, *Acrylic resins, *Chloroprenes.) (Viscosity, Measurement.) (*Polymerization, *Copolymerization, Reaction kinetics, Theory, Test methods.) Spectrographic analysis, Infrared spectroscopy, Ultraviolet spectroscopy, Synthesis, Chemical reactions, Catalysts.

Acrylate-styrene graft polymers were synthesized by initiating the polymerization of styrene with varying concentrations of partial tert-butyl-polyperacrylic esters prepared from polymethyl-acrylate and polyacrylylchloride. Equations for calculating the molar compositions of the polyperesters were derived. The kinetics and degree of polymerization were established by polymer conversion data and viscosity-molecular weight determinations, respectively. The theoretical relationships between initiator concentration and rate of polymerization on the one hand, and between initiator concentration and degree of polymerization on the other, as predicted by the kinetics of free radical polymerization, were found to be valid in the present experimental system using a polymeric free radical source. A limited effort was also expended on an acrylate-chloroprene graft polymer. (Author)

AD-264 323 Div. 4
(TIPSB/CW) OTS price $1.10

Illinois U., Urbana.
STUDY LEADING TO THE DEVELOPMENT OF POLYMERS FOR USE IN HIGH TEMPERATURES.
Quarterly progress rept. no. 9, 1 June-31 Aug 61,
by Therald Moeller and Antonio Vandi.
31 Aug 61, 7p. incl. tables.
(Contract DA 11-022-ORD-2956)
Unclassified report

DESCRIPTORS: (*Heat resistant polymers, Metalorganic compounds, Alkyl radicals, Amides, Phosphorus compounds, Phosphoric acids, Chlorides, Sulfur compounds, Sulfones, Chemical reactions.) (Phenyl radicals, Magnesium compounds, Bromides, Grignard reagents.) Physical properties, Synthesis, Pyrolysis, Stability, Temperature.

Reactions of bis-trichlorophosphazosulfone and of the dialkylamides of trichlorophosphazosulfuric acid with organo-metallic compounds have been completed during this synthesis period. Phenylmagnesium bromide and p-tolylmagnesium bromide have been employed as typical Grignard reagents and have been caused to react with the corresponding chlorides, leading to eleven new completely substituted compounds never reported before in the literature. According to the yields in which these compounds were obtained, substitutions appear to be more facile in introducing a phenyl radical than in the case of p-tolyl group. The compounds have been characterized in terms of analysis, melting point, and infra-red spectrum. Their thermal stabilities at 200 C. and 250 C. have been evaluated also. (Author)

AD-264 329 Div. 4, 25
(TIPSP/JDP) OTS price $4.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
TABLES OF LIGHT SCATTERING FUNCTIONS FOR RANDOM COIL POLYMERS,
by David W. Levi and Hsueh T. Lee. Sep 61, 44p. incl. illus. tables (Technical rept. no. FRL-TR 46)
(Proj. 599-01-004)
Unclassified report

DESCRIPTORS: (*Polymers, Styrenes, Toluenes, Optics, Osmotic pressure, Light, Scattering, Tables, Functions.) (*Physical chemistry, Particles.)

Tables and figures showing the variation of the particle scattering factor for random coil polymers of various polydispersities are presented. A comparison is made with an experiment using a polystyrene fraction. (Author)

AD-264 331 Div. 4
(TIPSB/CW) OTS price $1.60

Interchemical Corp., New York.
REACTIONS OF AZIRIDINES WITH ALCOHOLS.
Rept. no. 4, 16 May-15 Aug 61,
by P. Resnick, H. C. Yao and others. 10 Sep 61, 14p. incl. illus. tables.
(Contract N123(60530)24919A, Proj. 94021-500)
Unclassified report

DESCRIPTORS: (*Alcohols and Acids, *Ethylenimines, Chemical reactions with Benzoyl radicals, Chlorides, Sulfuric acid, Methyl radicals, Amides, Glycols, Ethylenes, Propenes.) (Catalysts, Isomers, Synthesis, Hydrolysis, Polymers.)

In this period the reactions of 1-(2,6-dichlorobenzoyl) aziridine in excess ethanol were studied. The product under all conditions was N-(2-ethoxyethyl)2,6-dichlorobenzamide. Further studies of the alcohol-aziridine reaction in 1:1 molar ratio were continued. Rate studies were made of the reactions of the chlorinated benzoylaziridine and of 1-(p-nitrobenzenesulfonyl)-2,2-dimethyl aziridine. Identification of the ring opened alcoholysis products of 1-(benzenesulfonyl)-2,2-dimethyl aziridine was continued. (Author)

AD-264 343 Div. 4
(TIPSM/EJH) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
TRIPHENYLGERMYL-SUBSTITUTED FERROCENES. NEW SYNTHESES OF FERROCENYL LITHIUM AND GRIGNARD REAGENTS,
by Dietmar Seyferth, H. P. Hofmann and others.
2 Oct 61, 17p. incl. illus. 19 refs. (Technical rept. no. 7)
(Contract Nonr-184143, Proj. NR 356-391)
Unclassified report

DESCRIPTORS: (*Ferrocenes, *Metalorganic compounds, Reagents, *Grignard reagents.) (Phenyl radicals, *Germanium compounds, *Ferrocenes.) (*Ferrocenes, *Lithium compounds.) (Methyl radicals, *Silanes, *Ferrocenes.) (Phenyl radicals, *Germanium compounds, *Titanium compounds, *Polycylic compounds, Chlorides.) (Phenyl radicals, *Germanium compounds, *Manganese compounds, Carbonyl radicals.) (Phenyl radicals, *Germanium compounds, *Iron compounds, *Monocyclic compounds, Carbonyl radicals.) (Synthesis, Grignard reactions, Chemical reactions, Substitution reactions.) Sodium compounds, Mercury compounds.

Treatment of the disodioferrocene with magnesium bromide in ether represents a new route to the ferrocene di-Grignard reagent; addition of triphenylbromogermane to the di-Grignard solution resulted in almost none of the disubstituted product, but a 32% yield of triphenylgermylferrocene was realized. A new preparation of ferrocenyllithium and 1,1'-ferrocenylenedilithium by the transmetalation reaction occurring between ethyllithium and the corresponding chloromercuriferrocenes in ether is described. The reaction of 1,1'-ferrocenylenedilithium with trimethylchlorosilane produced significant amounts of the monosubstituted product in addition to 1,1'-bis(trimethylsilyl)ferrocene. The preparation of 1,1'-bis(triphenylgermyl)titanocene dichloride, triphenylgermylmanganese pentacarbonyl and triphenylgermyl-pi-cyclopentadienyliron dicarbonyl is described. (Author)

AD-264 359 Div. 4, 25
(TIPSM/EJH) OTS price $2.60

Cornell U., Ithaca, N. Y.
CRITICAL OPALESCENCE OF POLYSTYRENE IN CYCLOHEXANE TRANSMISSION MEASUREMENTS,
by P. Debye and B. Chu. 31 Aug 61, 13p. illus. table (Technical rept. no. 4)
(Contract Nonr-40117) Unclassified report

DESCRIPTORS: (Solutions of Polymers, *Styrenes in Organic solvents of *Cyclohexanes, Measurement of *Light transmission, Temperature, Nuclear forces.) (*Light, Scattering, Polarization in Solutions.) Thermodynamics, Determination, Molecules, Molecular weight, Theory.

In the vicinity of the critical point, angular dissymmetry of scattering is observed. Its amount is connected with the range of molecular forces. Integrated over all angles it reveals that the total scattering is less than that calculated according to Einstein. At the same time the scattered light is less blue than anticipated according to Rayleigh. This effect was investigated on the system polystyrene-cyclohexane by measurements of the wavelength dependence of the total turbidity of the solution at its critical concentration as a function of the temperature. The interaction range as calculated from the data is in good agreement with values calculated from dissymmetry measurements. (Author)

AD-264 360 Div. 4, 25
(TIPSM/EJH) OTS price $2.60

Cornell U., Ithaca, N. Y.
CRITICAL OPALESCENCE OF POLYSTYRENE IN CYCLOHEXANE RANGE OF MOLECULAR FORCES AND RADIUS OF GYRATION,
by P. Debye and B. Chu. 1 Oct 61, 23p. incl. illus. (Technical rept. no. 5)
(Contract Nonr-40117, Proj. NR 051-360)
Unclassified report

DESCRIPTORS: (*Polymer solutions, *Polymers, *Styrenes, Organic solvents, *Cyclohexanes, *Light transmission, Refractive index.) (Solutions, *Light, *Scattering, Intensity, Temperature, Molecules, Molecular weight.) Thermodynamics, Mathematical analysis, Theory.

Visible light scattered by binary mixtures of critical concentration of ordinary molecules at small temperature distances above the critical temperature shows an angular dissymmetry which can be related to the range of molecular forces. The theory of critical opalescence is extended to polymer solutions of high molecular weight for which an additional dissymmetry due to the extension of the polymer coil is observed. The range of molecular forces and the radius of gyration at the critical concentration can be determined simultaneously by measurements of the angular dependece of scattered intensity at different temperatures above the critical temperature. Results of experiments on a solution of polystyrene (M sub n = 2,820,000) in cyclohexane are reported. (Author)

AD-264 388 Div. 4, 17
(TIPSB/CCH) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
MEASUREMENT OF SOLUBILITY OF HYDROGEN IN PALLADIUM,
by E. R. Thilo. June 61, 22p. incl. illus. tables (Memo. rept. no. M61-32-1)
Unclassified report

DESCRIPTORS: (Measurement of *Solubility of *Hydrogen in Palladium.) Tests, Experimental data of Absorption, Test methods, Tables in Metallurgy.

A description is given of the experimental setup used to study the absorbtion and desorbtion of hydrogen into and from palladium. The experimental procedure used and methods of data reduction are covered. The basic data obtained for a number of runs are included in the Appendix. (Author)

AD-264 422 Div. 4, 10, 12
(TIPSM/SEB) OTS price $7.60

Rand Corp., Santa Monica, Calif.
A PARAMETRIC STUDY OF CERTAIN LOW-MOLECULAR-WEIGHT COMPOUNDS AS NUCLEAR ROCKET PROPELLANTS, V. METHANE,
by F. J. Krieger. Aug 61, 64p. incl. illus. tables, 16 refs. (Rept. no. RM-2807-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: (Guided missiles, *Nuclear propulsion, Rocket propulsion.) (Gaseous rocket propellants, Rocket propellants, Propellants, *Hydrogen compounds, *Methanes, Physical properties, Enthalpy, Entropy, Thermodynamics, Specific impulse, Theory, Tables, Handbooks.)

A parametric investigation was made of a series of low-molecular-weight, high-hydrogen-content compounds as propellants for nuclear-powered rockets. A two-part computational program was

carried out for CH4; the results are presented in both tabular and graphic form. The results of the first part of the program are presented in static form, that is, by the conventional Mollier diagram, in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. The results of the second part of the program are presented in dynamic form by a series of diagrams in which specific impulse is plotted against pressure, with cross plots of chamber temperature, exhaust temperature, and rocket-nozzle area. It was assumed that the propellant gas, starting with a nonzero chamber velocity, maintained instantaneous chemical equilibrium composition as it expanded isentropically through a de Laval nozzle. (Author)

AD-264 472 Div. 4, 16
(TIPSB/CCH) OTS price $6.60

Texas A. and M. Research Foundation, College Station.
STUDY OF STRUCTURES AND REACTIVITIES OF BOROXAZOLIDINES.
Final technical rept. 1 June 59-31 Aug 61,
by Howard K. Zimmerman. 31 Aug 61, 63p. incl. illus tables.
(Contract DA 23-072-ORD-1432, Proj. 2359)
(AROD rept. no. 2359:7)
Unclassified report

DESCRIPTORS: Chemistry of *Drugs, Physical properties, Chemical properties, Ionization, *Chemical reactions, Acid-base equilibrium, Stability.

The current status of boroxazolidine chemistry is reviewed. The predominant role of the steric requirements of N-substituted groups in determining the formation and stability of diptych and monocyclic boroxazolidines is thoroughly demonstrated through preparative experience with a wide range of reagent systems, by dipole moment data, and by studies on the rates of N-B cleavage by boroxazolidines in acidic solutions. Acidic ionization constants over the temperature range from 15 to 55 C have been determined for phenyl- and n-butyl dihydroxyboranes and for diphenyl hydroxyborane, as well as for a series of N-substituted diethanolamine hydrochlorides. The relation of the ionization properties to structure is considered. The migrations of 69 aminoalcohols, each in three different solvent systems, have been determined on Whatman No. 1 paper. Pharmacological tests of nine boroxazo compounds have shown no significant useful results, but, on the contrary, have revealed a relatively high level of toxicity which is probably a consequence of the hydrolytic instability of the compounds tested. (Author)

AD-264 486 Div. 4, 25
(TIPSP/JDP) OTS price $1.60

Washington U., Seattle.
ON THE CLASSICAL APPROXIMATION IN UNIMOLECULAR REACTIONS AND MASS SPECTRA,
by B. S. Rabinovitch and J. H. Current. 1 Sep 61, 25p. incl. illus. tables, 26 refs. (Technical rept. no. 7)
(Contract Nonr-47714, Proj. NR 051-217)
Unclassified report

DESCRIPTORS: (*Atomic energy levels, Excitation, *Harmonic oscillators, Mass spectroscopy, *Chemical reactions, Methanes, Chlorides, Propenes, Deuterated compounds.) (*Atomic energy levels, Excitation, *Quantum statistics, *Chemical reactions, Relaxation time, Oscillators, Reaction kinetics.) (Molecules, Molecular association, Gases.)

This report includes:
Washington U., Seattle.
SYSTEMS OF OSCILLATORS WITH STATISTICAL ENERGY EXCHANGE IN COLLISIONS, by Michael Hoare. June 61, (Contract Nonr-47714, Proj. NR 051-217)

AD-264 512 Div. 4
(TIPSM/SEB) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
PHYSICO-CHEMICAL PRINCIPLES OF VACUUM-THERMIC TREATMENT OF LITHIUM,
by T. F. Fedorov and F. I. Shamray. 4 Aug 61, 17p. incl. illus. 19 refs. (Trans. no. MCL-962 of Primeneniye Vakuuma v Metallurgii, Moscow: 137-142, 1960)
Unclassified report

DESCRIPTORS: (*Lithium, Preparation, Purification, Vaporization, Vacuum furnaces.) (Lithium compounds, Oxides and Aluminates, Reduction, Reaction kinetics.) (Lithium compounds, Aluminates and Silicates, Enthalpy, Entropy, Thermodynamics.) (Technological intelligence, Translations on USSR.)

The silico-thermic reduction of lithium oxide and alumino-thermic reduction of lithium aluminate at equilibrium were studied by the outflow method. Functional relationship between isobaric potential and temperature was established for lithium orthosilicate and lithium monoaluminate formation. Standard entropy and enthalpy values were derived for these compounds. The method of continuous weighing was used to study the kinetics of aluminothermy with respect to lithium aluminate. The time period dominated by the kinetic factor was defined. The limiting stage is probably associated with the resorption of gaseous lithium. The metal produced by vacuum aluminothermy exceeded in purity the electrolytic product. Black electrolytic lithium was refined in a bubble cap column. The effectiveness of this refining method was demonstrated. (Author)

AD-264 629 Div. 4
(TIPSB/LH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
MEASUREMENT OF THE PRESSURE DIFFERENCES OF B1OF3 AND B11F3 VAPORS,
by A. V. Borisov and I. G. Gverdtsiteli. 18 Sep 61, 5p. incl. illus. table (Trans. no. MCL-1422 of Zhurnal Fizicheskoy Khimii 35:1212-1214, 1961)
Unclassified report

DESCRIPTORS: (*Translations, *Technological intelligence, *USSR.) (*Boron compounds, Fluorides, Isotopes, Vapors, Measurement, Mathematical analysis.)

AD-264 658 Div. 4, 25, 15
(TIPSP/WH) OTS price $6.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
PLANE COLLISIONS OF MURNAGHAN PLASTICS,
by P. J. Blewett. Aug 61, 59p. incl. illus. table (Rept. no. AFSWC TN 61-32)
Unclassified report

DESCRIPTORS: (Metal plates, Mechanical properties, Aluminum, Acrylic resins, Ethylenes, Polymers, *Plasticity, Hydrodynamics.) (*Equations of state, Impact shock.) (Hydrodynamics, Applied mathematics, Shock waves.) Sheets, Plastic flow, Mathematical analysis.

The one-dimensional problem of a flat plate (infinite in the plane normal to its direction of motion) colliding with a target of like material is treated hydrodynamically, and follows closely the treatment of Fowles. The theory of characteristics is developed in detail. The results of desk calculations for collisions of aluminum, Lucite, and polyethylene for plates 1 mm in thickness and initial speeds of 1 mm/microsec are presented graphically. In each case an empirical Murnaghan equation of state is used for these materials; changes across the shock front are assumed isentropic. The results of a second calculation for the cases of Lucite and polyethylene plates, 1 mm in thickness and with initial kinetic energies equal to that of the aluminum plate in the first calculation, are also presented in a series of graphs for each collision. Further, equations are developed for calculation of the dissipation of total kinetic energy of the plate-target system with time, and results for a few representative times for each collision are compared. (Author)

AD-264 676 Div. 4
(TIPSM/REB) OTS price $1.10

Florida U. Engineering and Industrial Experiment Station, Gainesville.
FLUOROCARBON N-F COMPOUNDS.
Quarterly technical rept. no. 9,
by J. A. Young and R. D. Dresdner. 1961,
6p. incl. tables.
(Contract DA 01-009-ORD-772)
(ARPA Order no. 40-59, Task no. 3)
Unclassified report

DESCRIPTORS: (*Fluorocarbons, *Nitrogen compounds, *Fluorides, Synthesis, Polymerization.) (*Carbon compounds, Fluorides, Polymerization with Cesium compounds as Catalysts, Temperature, Chemical reactions, Infrared spectroscopy, Nuclear magnetic resonance, Chromatographic analysis, Isomer.) (*Polymers, Propyl radicals, *Acetylenes, Fluorides, Preparation by Gamma rays, Radiation effects, X-ray spectrum.)

The effect of increasing reaction temperature on the catalytic dimerization of C3F6 is discussed. From 100 to 200 C, conversion to products increases greatly, but the ratio dimers: (trimers and higher) decreases so that at 200 C it is less than 10% of the ratio at 100 C. Isomer distribution also is temperature dependent but is little affected by pressure over the range studied. Identities of the dimers agree with previous identities, but the cis and trans-isomers of $(CF_3)_2CFCF{:}CFCF_3$ have apparently been isolated. The latter gives no C:C band in the infrared. A somewhat modified mechanism for the dimerization is presented. Results of an x-ray analysis of the polymer produced by gamma irradiation of perfluoropentyne-2 are discussed. (Author)

5. COMMUNICATIONS

AD-264 003 Div. 5, 25
(TIPSE/CDM) OTS price $4.60

General Applied Science Labs., Inc., Westbury, N. Y.
PRELIMINARY SPEECH ANALYSIS,
by James West. May 61, 45p. incl. illus. table.
(GASL rept. no. 5271-FR-1)
(Contract AF 30(602)2353, Proj. 4027)
(RADC TR 61-144) Unclassified report

DESCRIPTORS: (*Speech, *Spectrographic analysis, Analysis.) (Identification systems, Automatic.) (*Speech representation, Recording systems, *Frequency analyzers, Sound, Audiofrequency.)

A study of the frequency spectra of speech sounds was made with a high resolution spectrum analyzer. The results of the analysis are summarized in photographs of the changes in the frequency distribution with time. Analyses of the unvoiced stop t in the word tu is provided. The transition frequencies from the consonant to the vowel are easily measured. Also noticeable is the amount of energy at the pitch frequency and its first harmonic. In the vowel portion of tu, the pitch harmonics which make up the formants are very easily separable. Twenty millisecond intervals were used to observe the spectrum changes. Other intervals such as 60 milliseconds and 100 milliseconds were employed. These still allowed the observation of phoneme characteristics. Other combinations such as du, lu and ru were analyzed. (Author)

AD-264 029 Div. 5, 8
(TIPSE/DLW) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
PROJECT ECHO - FM DEMODULATORS WITH NEGATIVE FEEDBACK,
by Clyde L. Ruthroff. Oct 61, 8p. incl. illus.
(Technical note D-1134)
(In cooperation with Bell Telephone Labs.)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-1134.

DESCRIPTORS: (*Satellite vehicles, Balloons, *Radio communication systems, Ground support equipment.) (*Radio receivers, *Detectors, Frequency modulation, Feedback, Automatic volume control, Discriminators, Oscillators, Intermediate frequency amplifiers, Design.) (Radio signals, Radio waves, Reflection, Electromagnetic wave reflections, Signal-to-noise ratio, Measurement.) (Frequency modulation, Broadband.)

The primary experimental objective of Project Echo was the transmission of radio communications between points on the earth by reflection from the balloon satellite. Owing to the large path losses from transmitter to receiver via the satellite, a wide-band frequency modulation technique was used in which bandwidth was traded for signal-to-noise ratio. The FM receiving demodulators are described. Negative feedback applied to the local oscillator reduces the FM modulation index in the receiver IF amplifiers, resulting in threshold performance superior to that of conventional FM receivers. (Author)

AD-264 056 Div. 5, 8
(TIPSE/DLW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
OPTIMAL FILTER PASSBAND IN A SYSTEM FOR RECEIVING FM SIGNALS WITH TRACKING TUNING,
by Ya. G. Rodionov, tr. by Arthur R. Kraiman. May 61, 15p. incl. illus. tables (Rept. no. STL-TR-61-5110-26, Trans. from Radiotekhnika (Radio Engineering), Vol. 15, no. 9, 1960)
Unclassified report

DESCRIPTORS: (*Band-pass filters, Radiofrequency filters, Intermediate frequency filters, Narrowband, *Radio receivers, Radar receivers, Intermediate frequency amplifiers, Coupling circuits, Radio interference, Reduction, Design.) (Frequency modulation, *Radio signals, Radio reception, Tuning circuits, Signal-to-noise ratio, Measurement, Theory.) (Technological intelligence, USSR, Translations.)

The optimal value of filter bandwidth is established for a receiver with tracking tuning from the point of view of providing the greatest noise stability and the highest quality reproduction of a useful signal. The tracking tuning system consists of a narrow-band intermediate-frequency amplifier, a reactance tube connected in parallel to this IF amplifier and varying its resonant frequency, a frequency detector of the usual type, and a special coupling circuit giving a selective character to the control of the filter resonant frequency. (Author)

AD-264 084 Div. 5, 25
(TIPSP/TL) OTS price $1.60

Optical Communications Lab., Northwestern U., Evanston, Ill.
ACOUSTICAL RESONANCE IN LOW PRESSURE ARCS (PART I). DEVELOPMENT OF PHOTOCONDUCTIVE CELLS FOR INFRARED COMMUNICATIONS SYSTEMS (PART II).
Final rept.,
by R. J. Cashman. 30 Apr 61, 15p. incl. illus. (Contract NObsr-72500)
Unclassified report

DESCRIPTORS: (Low pressure research, *Electric arcs, Gas discharges, Modulation, Acoustics, Resonance, Noise, *Infrared radiation.) (*Infrared detectors, Photoelectric cells, Photoconductivity, Lead compounds, Selenides, Thallium compounds, Sulfides, *Noise, Recombination reactions.) (*Thermoelectricity, Cooling.) Infrared communication systems.

Part I. The causes of instability in low pressure arcs of the type sometimes used in infrared communication systems were investigated. Part II. A study was made of detectors and their properties as used in infrared communication systems. Three investigations were active: (1) The frequency dependence of the noise from evaporated lead selenide photoconductors was determined at room temperature and at 196 K. (2) The noise from evaporated lead sulfide photoconductors was investigated. Sensitive areas were delineated by cutting through the film with different scribing tools. (3) The construction of a thermoelectric cooler for use with the detectors was treated. (Author)

AD-264 158 Div. 5, 15, 8, 30
(TIPSP/MFA) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
OPTIMAL PROCESSES IN SAMPLED DATA CONTROL SYSTEMS,
by Ya. A. Tsypkin, tr. by Z. Jakubski. July 61, 39p. incl. illus. (Rept. no. STL-TR 61-5110-27, Trans. from Izvestiya Akademii Nauk SSSR, Energetika i Avtomatika, No. 4, 1960)
Unclassified report

DESCRIPTORS: (Digital systems, *Data processing systems, Statistical analysis, *Sampling, USSR.) (*Digital computers, Computer logic, Programming.) (Equations, Algebra, Operators (Mathematics), Calculus of variations, Difference equations.) (Control systems, Pulse counters, Pulse analyzers.)

Optimal processes were applied to sampled data control systems. The design of optimal sampled-data systems is related to the solution of two fundamental problems (1) determining the optimal control impulse which induces the optimal process, and (2) determining the structure of the optimal sampled-data control system by which the optimal control impulse is shaped by signals which characterize the state of the system and are measurable. These systems are described by difference equations and computers are used to solve the equations.

AD-264 166 Div. 5, 30
(TIPSE/RD) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE PROBLEM OF NONUNIFORM DISCRETIZING OF CONTINUOUS SIGNALS,
by Z. Fridrikh, tr. by Z. Jakubski. Sep 60, 21p. incl. illus. (Rept. no. STL-TR 61-5110-46, Trans. from Izvestiya Vysshikh Uchebnykh Zavedenii. Radiofizika, 3:316-327, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Data transmission systems, *Communications theory, *Information theory.) (Data processing systems, Communications theory, Information theory.) (Control systems, Automatic.) (Computers, Computer logic, Mathematical logic.) (Numerical analysis, Functions.) Cybernetics, Recording systems.

On the basis of the theory of approximation of functions, new methods are proposed for discretizing continuous signals when the readings are made at uneven distances. The intervals between readings are related to the order of the approximation polynomial by a permissible value of the error of approximation; in addition, readings are taken not of the instantaneous value of the signal, but using the approximation function. (Author)

AD-264 252 Div. 5, 8
(TIPSE/DLW) OTS price $7.60

Alpha Corp., Richardson, Tex.
AIR-GROUND-AIR COMMUNICATIONS AUGMENTED 4-WHEELS.
Final rept.,
by Rolf W. Wollan. 1 July 61, 72p. incl. illus. tables (Rept. no. AER 130)
(Contract AF 19(604)8019)
(AFCRL-540) Unclassified report

DESCRIPTORS: (*Air traffic control systems, Air control centers, Mobile, *Radio communication systems, High frequency, Very high frequency, Ultra high frequency, Transmitter receivers, Antennas, Miniature electronic equip-

ment, Design, Installation.) (Air force communications, *Voice communication systems, Radio equipment, Power supplies, Test equipment, Design.) (Radio interference, Reduction.)

The augmented 4-wheels program was initiated to up-date the capability of the 4-wheels air-transportable, air traffic control system. For the VHF and UHF air-ground air communications part of this system, this meant primarily the addition of new up-to-date channelized radio equipment. Improvements in the state of the art and miniaturization permitted the selection of much smaller and lighter components. At the same time, a study of the interference problems predicted the degree of pre-selection and antenna isolation parameters required for the operation of the multi-channel system from a single shelter. The resultant system includes 7 20-watt UHF transceivers connected through 2 UHF tandem cavity antenna couplers to 2 UHF antennas, 4 25-watt VHF transmitter/receivers connected through 2 VHF antenna couplers to 1 VHF antenna couplers to 1 VHF antenna, and 1 1-kilowatt HF single-sideband transmitter/receiver connected through 1 antenna coupler to 1 HF antenna. Single mast construction using collinear stacking of UHF and VHF antennas provides the antenna configuration for the system. (Author)

AD-264 269 Div. 5, 22
(TIPSP/WH) OTS price $1.60

Naval Research Lab., Washington, D. C.
SOME PROBLEMS IN THE EMPLOYMENT OF THREE-DIMENSIONAL INDICATORS IN MILITARY SYSTEMS,
by John H. Hill and Herschel C. Self. 28 Aug 61, 11p. (NRL Problem no. Y02-17)
Unclassified report

DESCRIPTORS: (*Display systems, *Stereoscopic vision, Stereoscopes, *Combat information centers.) (Optics, Fire control systems, Antiaircraft fire control systems.) Military equipment.

The most likely areas of utility for 3-D displays in such a system would be in threat evaluation and weapon assignment operations. Although a categorical statement cannot be made that 3-D displays are good or bad for such application, this report stresses the following considerations: (1) The need for definition of the operational requirement for such a display. Interested human factors specialists should take the initiative in seeking such a definition. This step is a prerequisite to determining the utility of these indicators. (2) The possible advantages of 3-D indicators. (3) The read-out problems facing the operator using such a display. (4) The instrumentation problems imposed by such displays. (Author)

AD-264 276 Div. 5
(TIPSE/CRJ) OTS price $22.25

Bell Telephone Labs., Inc., Whippany, N. J.
UNICOM, UNIVERSAL INTEGRATED COMMUNICATIONS SYSTEM. VOLUME 2.
Quarterly progress rept. nos. 7-8, Vol. 2, 1 Jan-30 June 61.
30 June 61, 433p. incl. illus.
(Contract DA 36-039-sc-78806; In cooperation with ITT Federal Labs. and Radio Corp. of America)
Unclassified report

DESCRIPTORS: (*Military communications, Communication systems, Design.) (Data transmission systems, Digital systems, Tests.) (Switching circuits, Analog systems.) (Voice communication systems, Radio communication systems.) (Speech transmission, Pulse modulation, Coding.) (Frequency shift keyers, Errors, Analysis.) (Radio transmission, High frequency.)

AD-264 312 Div. 5, 8
(TIPSE/DLW) OTS price $2.60

General Electric Co., Syracuse, N. Y.
LUNAR REFLECTION STUDIES.
Interim rept.
6 July 61, 30p. incl. illus. tables.
(Contract AF 19(604)6634)
(AFCRL-553) Unclassified report

DESCRIPTORS: (*Radio communication systems, Radio waves, Reflection, Electromagnetic wave reflections, Radio signals, Moon, Ultra high frequency, Data transmission systems, Multipath transmission, Feasibility studies.) (Radio signals, Attenuation, Propagation, Sidebands, Frequency shift, Measurement.) (Parabolic antennas, Parametric amplifiers, Radio transmitters, Radio receivers, Correlation techniques, Test equipment.) Antennas, Radio equipment, Amplifiers.

Research is concerned with the possibility of establishing a lunar reflection radio communication path. The ever changing multipath structure of the lunar propagation path creates distortions of several types on signals reflected from the moon. These distortions serve to limit the coherent bandwidth of the path, limiting the usefulness of the moon for communication purposes. Tests were conducted utilizing double sideband suppressed carrier transmissions at 915 Mc. The amplitudes of each sideband were recorded, and cross-correlation coefficients computed for various sideband frequency separations. The results show that the moon has a very low coherent bandwidth which is less than 1000 cps if stringent requirements are placed on the required quality of the transmission path. These results are compared to those obtained by tropospheric scatter and Echo satellite reflection, showing that the poor sideband correlation and resulting signal distortion are uniquely due to the moon. (Author)

AD-264 322 Div. 5
(TIPSE/RD) OTS price $9.60

Lincoln Lab., Mass. Inst. of Tech., Lexington,
ERROR STATISTICS OF A-1 DIGITAL DATA SIGNALLING EQUIPMENT OVER VARIOUS MEDIA,
by Paul L. Grant. 15 Sep 61, 112p. incl. illus. tables, 10 refs. (Rept. no. 25G-0037)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Data transmission systems, Digital systems, Tests, Errors.) (Errors, Statistical analysis, Statistical distributions.) (Circuits, Telephones, Microwave networks.)

As part of the research effort in digital data communications, the A-1 Digital Data System was tested. The telephone circuits used for transmission were two K-carrier circuits, three TD-3

(microwave) circuits, and one H-44 cable. Lengths of the looped circuits were from 300 to 870 miles. Both the cable and the K-carrier circuits showed an average error rate of 1 in 100,000 or better, whereas the microwave circuits tended to be at least one magnitude worse. (Author)

AD-264 328 Div. 5
(TIPSE/IRD) OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
WIDE-BAND CARRIER COMMUNICATIONS. VOLUME IV. RANDOM SIGNAL CODING FOR FINITE MESSAGE SETS.
Technical rept. on Communications,
by T. L. Grettenberg. June 61, 65p. incl. illus.
(Rept. no. 6-90-61-59, supersedes Stanford Electronics Labs., Rept. no. TR 2004-3, AD-262 357)
Unclassified report

DESCRIPTORS: (*Communication systems, Broadband, *Communications theory.) (Coding, Statistical distributions, Errors, Probability, Matrix algebra.)

The divergence between statistical hypotheses is used as a criterion for selection of a finite transmitter alphabet in a communication system. The members of the transmitter alphabet are sample functions from one of a finite set of normally distributed random processes. The receiver uses a maximum-likelihood decoding procedure, and the probability of error is evaluated for this receiver for a class of codes having orthogonal covariance functions. The codes with maximum divergence between alternate hypotheses are shown to be a special case of the codes with orthogonal covariance functions. The error probabilities of the maximum-divergence codes are then compared with the other codes having orthogonal covariance functions. (Author)

6. DETECTION

AD-263 921 Div. 6, 12, 2, 25
(TIPSE/NTM) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
TRACKING OF MISSILES AND SPACE VEHICLES. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 1, Jan-May 60.
31 May 60, 13p. incl. tables.
Unclassified report

DESCRIPTORS: (USSR, Technological intelligence.) (*Tracking, Spaceships, Satellite vehicles, Guided missiles.) (Ions, Ionosphere, *Ionospheric propagation, Plasma physics, Gas ionization, Ionospheric disturbances, Meteors.) (Thermal radiation, Moon.) (Magnetic fields, Electromagnetic fields, Magnetic storms, Siberia, Auroral, Electromagnetic waves.) (Antennas, *Radio astronomy, Radio waves, Traveling wave tubes, Parametric amplifiers, Tracking telescopes, Radio transmission.) (Communication systems, Arctic regions.)

AD-263 930 Div. 6, 2, 1
(TIPSP/GRW) OTS price $9.10

Naval Air Station, Norfolk, Va.
HURRICANE RECONNAISSANCE WITH AIRBORNE RADAR.
Rept. on Hurricane and Typhoon Forecasting,
by Myron G. H. Ligda. June 61, 101p. incl. illus. tables (Rept. no. NWRF 12-0661-046)
(In cooperation with Stanford Research Inst.)
Unclassified report

DESCRIPTORS: (*Weather forecasting, Radar analysis, *Hurricanes, Tropical cyclones by *Meteorological radar, Airborne.) (Hurricane tracking, *Radar echo areas, Radar targets.) (*Reconnaissance planes, Radar ranges.)

AD-263 963 Div. 6
(TIPSE/RD OTS price $9.60

Servo Corp. of America, Hicksville, N. Y.
DOPPLER VOR SIMULATOR STUDY REPORT ARTICLE 1 - ITEM A1 OF CONTRACT FAA/BRD-143,
by J. M. Beukers. 6 June 60, 108p. incl. illus. tables. (Rept. no. SCA-11500-R9)
(Contract FAA/BRD-143)
Unclassified report

DESCRIPTORS: (*Radio ranges, Radio receivers, Very high frequency, Tests.) (*Radio signals, *Doppler systems, *Simulation, Sidebands, Harmonic analysis.) (Navigation, Electronic equipment.)

Research concerns the investigation and behavior of a number of VOR receivers when presented with a single sideband doppler VOR signal. It has been an aim to determine the degree of compatibility to be expected in a navigational system containing both conventional VOR and doppler ground transmitting stations without modification to receivers currently in operation. In addition to the single sideband signal a double sideband signal was simulated, the purpose of which was to determine whether a degradation in receiver performance is to be expected when changing the VOR system from the existing double sideband signal to a single sideband signal. It was concluded: since receivers are not tolerant to an idealized single-sideband signal and even less so of the practical doppler SSB signal, and considering the satisfactory operation of the system in a double-sideband configuration, that a double-sideband signal be used in the compatible doppler VOR system. (Author)

AD-264 009 Div. 6, 30, 12
(TIPSE/DLW) OTS price $12.00

Land-Air, Inc., Point Mugu, Calif.
PROCEDURE FOR THE EVALUATION OF CORRELATION TRACKING AND RANGING (COTAR),
by C. H. Tapper, ed. by A. L. Powell. 14 Aug 61, 164p. incl. illus. tables (Rept. no. 30)
(Contract N-123(61756)19425A/PMR; In cooperation with the Cubic Corp., San Diego, Calif.)
Unclassified report

DESCRIPTORS: (*Tracking, *Range finding, *Telemeter systems, *Guided missile tracking systems, Telemetering receivers, Antennas, Instrumentation, Design, Tests.) (*Radio signals, Telemetering data, Phase measurement, Correlation techniques, *Data processing systems, Programming, Digital computers.) (Guided missiles, Surface to surface, Radar targets, Detection, Radar tracking.) (Test facilities, Tests.)

Division 6 - DETECTION

An outline is presented of the evaluation tests at the Pacific Missile Range of the correlation tracking and ranging (COTAR) System, as a radar acquisition device. The instrumentation system is described. The theory of operation and supporting mathematics is presented to explain the method of determining directional cosine functions for the X and Y axes of its specialized antenna field by measuring the phase difference in signals received. Working forms, data reduction procedures, and computer programming developed for these evaluation and acceptance tests are included. (Author)

AD-264 033 Div. 6, 12
(TIPSE/DLW) OTS price $1.10

Antenna Lab., Ohio State U. Research Foundation, Columbus.
THE AVERAGE RADAR ECHO AREA OF ORBITING SATELLITES.
Memo. rept.,
by Byron Potts. 23 June 61, 5p. illus. (Scientific rept. no. 4; Rept. no. 1116-7)
(Contract AF 19(604)7270)
(AFCRL-715) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Radar echo areas, Radar reflections, High frequency, Measurement.) (Radar signals, Ionosphere, Ionospheric propagation, Electromagnetic wave reflections.) (Satellite vehicles, Detection.)

Average radar echo areas are listed for all orbiting United States satellites (as of March 31, 1961) at the frequencies of 10, 20 and 30 mc. (Author)

AD-264 261 Div. 6, 8, 12
(TIPSE/DLW) OTS price $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIO TRACKING TECHNIQUES AND PERFORMANCE OF THE UNITED STATES DEEP SPACE INSTRUMENTATION FACILITY,
by N. A. Renzetti, J. P. Fearey, and others.
24 Mar 61, 44p. incl. illus. tables (JPL Technical rept. no. 32-87)
(Contract NASw-6)
Unclassified report

Presented at COSPAR (Committee on Space Research) meeting, Florence, Italy, Apr. 1961.

DESCRIPTORS: (*Tracking, *Radio equipment, Instrumentation, *Spaceships, Satellite vehicles, Space probes, Lunar probes, *Doppler tracking, Doppler systems, *Telemeter systems, Telemetering receivers, Design, Effectiveness.) (Space flight, Orbital flight paths, Flight paths, Command systems.) (Parabolic antennas, Coupled antennas, Reflectors, Electronic equipment, Installation.) Antennas.

The United States Deep Space Instrumentation Facility (DSIF) has as its primary purpose the tracking and commanding of, and reception of data from, spacecraft at lunar and interplanetary distances. The tracking data provided by this facility consists of two angles and radial velocity, accurately time-labeled. This data is used by computing facilities to determine spacecraft orbits, to determine the appropriate time for the transmission of commands from the DSIF to a spacecraft and to determine the appropriate mid-course maneuver to be performed by the spacecraft. The data received by the DSIF from a spacecraft consists of telemetered information concerning both the spacecraft performance and the measurements of the scientific instrumentation aboard. (Author)

AD-264 282 Div. 6, 12
(TIPSE/DLW) OTS price $9.10

Cubic Corp., San Diego, Calif.
UHF EXTENDED RANGE SECOR SYSTEM.
Final engineering rept.
July 61, 104p. incl. illus. tables, 15 refs.
(Contract AF 08(606)918, AFSC Proj. 8852)
(APGC-TR-61-36) Unclassified report

DESCRIPTORS: (*Guided missile tracking systems, *Guided missiles, Surface to surface, Detectors, Tracking, Range finding, Velocity, Measurement, Ultra high frequency, Phase measurement, Detection, Correlation techniques, Feasibility studies, Design, Tests, Errors.) (*Radar beacons, Airborne, Miniature electronic equipment, Transistors, Reliability, Design, Tests.) Radar navigation.

The technical problems, design criteria, and results of laboratory tests on the coherent carrier-correlation detection kits and the model IV transponder are discussed in detail. These items are necessary to give the UHF, base timing, distance measuring equipment system an extended range capability. (Author)

AD-264 325 Div. 6, 12
(TIPSE/DLW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
200 MC BEACON TRACKING SYSTEM FOR REENTRY PHYSICS,
by Edwin F. Tarbox. 14 Sep 61, 21p. incl. illus.
(Rept. no. 312G-0004)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Re-entry vehicles, Research test vehicles, Surface to surface *Radar tracking, Automatic, Radar equipment, S band, Effectiveness.) (*Radio beacons, Airborne, Very high frequency, Tracking, Errors.) (*Radar antennas, Focusing, Servo systems, Switching circuits, Design.) (Re-entry aerodynamics, Plasma physics, Measurement.)

The beacon tracker at the Arbuckle Neck Site is multiplexed with the S-band radar and is capable of providing the antenna control system with pointing information so that an automatic track of a vehicle carrying a CW beacon can be obtained. This system was placed in operation in March 1960 and has successfully tracked vehicles both from Wallops Island and Eglin Air Force Base. (Author)

AD-264 345 Div. 6
(TIPSE/DLW) OTS price $5.60

Mallory, P. R., and Co., Inc., Indianapolis, Ind.
DESIGN AND FABRICATION OF RECEIVER, RADIO R-902(XE-1)/PRD.

Final rept., 30 June 59-15 Apr 61 on Development of Radio Receiver R-902(XE-1)/PRD for Direction Finder Set AN/PRD-7,
by M. M. Riddle. 15 Apr 61, 59p. incl. illus.
(Contract DA 36-039-sc-78351)
Unclassified report

DESCRIPTORS: (*Radio receivers, Very high frequency, Ultra high frequency, Mobile, *Direction finding, Design, Tests.) (Tuning devices, Crystal oscillators, Crystal mixers, Intermediate frequency amplifiers, Audio amplifiers, Power supplies, Oscillator circuits, Radio equipment, Design.)

Design work and test results are described on the experimental model of radio receiver R-902(XE-1)/PRD. This receiver is a portable, low battery drain equipment covering the 100 to 400 mc range. Final performance of the experimental model of R-902 receiver and its major subassemblies is discussed. Problem areas and measures taken to improve the final receiver design are presented. (Author)

AD-264 349 Div. 6
(TIPSE/CCD) OTS price $12.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATION OF NEW RADAR COMPONENTS AND TECHNIQUES. VOLUME I.
Annual rept. for 1960. 1 Sep 59-31 Aug 60, June 61, 68p. incl. illus. (Rept. no. ESL-AR-104, vol. 1)
(Contracts AF 33(616)5489 and AF 33(616)5477)
Unclassified report

DESCRIPTORS: (*Radar, Radar targets, Radar reflections, Radar echo areas, Radar signals, Scattering, Radar ranges.) (*Radar, *Radar equipment, Materials, Thin films of Gold, Ferroelectric materials, Conductivity, Parametric amplifiers, Magneto-optic rotation, Transducers, Microwave oscillators, Analysis.)

The radar research is divided into the three areas of systems, circuits and subsystems, and devices. Two systems investigations have been active. In the first, properties of the radar uncertainty function were examined in an effort either to find a modulation function that overcomes ambiguity limitations, or to prove that no such waveform exists. The second has been concerned with the development of a new theory of multiple-target radar. Progress is summarized for four circuits and subsystems projects. In the device area, a theory accounting for excess noise generation in thin gold films has been developed from experimental observations. A number of investigations were brought to a close; these were concerned with: thermal transducers; the Kerr magneto-optic effect in thin magnetic films; conductivity modulation of thin metallic films; construction techniques for thin-film electrophotoluminescent amplifiers; and ferroelectric materials for parametric amplifiers. (Author)

AD-264 383 Div. 6, 12
(TIPSE/DLW) OTS price $1.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
INFRARED BACKGROUND NOISE MEASURING PROGRAM AT THE U. S. NAVY UNDERWATER SOUND LABORATORY,
by Louis J. Free. 10 Aug 61, 11p. incl. illus. (USL Rept. no. 522)
Unclassified report

DESCRIPTORS: (*Sky brightness, *Infrared radiation, Measurement, Infrared scanning, Infrared spectroscopy, Spectrographic analysis.) (*Guided missiles, *Infrared tracking, Surface to surface, Signal-to-noise ratio, Tests.) (Infrared detectors, Radiometers, Infrared equipment, Test equipment, Test facilities.)

A short history is presented of the infrared background noise measuring program at the U. S. Navy Underwater Sound Laboratory. A discussion is given of the laboratory's participation in the 1959-1960 Interservice Radiation Measuring Program (IRMP 59/60). Wiener Spectra obtained during the September and November 1959 measuring period are shown. In addition, other measurements, technical problems encountered during IRMP 59/60, and future plans are discussed briefly. (Author)

AD-264 603 Div. 6, 5
(TIPSM/EJH) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
PROPERTIES OF PHOTODETECTORS. PHOTODETECTOR SERIES, 47TH REPORT,
by A. B. Naugle, J. D. Merriam, and W. L. Eisenman. 15 Aug 61, 27p. incl. illus. table (NOLC rept. no. 551)
Unclassified report

DESCRIPTORS: (*Infrared detectors, *Infrared photoconductors, Detectors, *Photoelectric cells, *Infrared photoelectric cells, Sensitivity.) (*Infrared photoelectric cells, Tellurium and Lead compounds, Sulfides and Indium compounds, Antimonides and Silicon.) Electrical properties, Physical properties.

Results of tests on 8 photodetectors are presented. Data sheets are included on Te cells from Minneapolis Honeywell; InSb cells from Block Associates, Inc. and Texas Instruments, Inc.; PbS cells from Tupper Trent Co. and Eastman Kodak Co.; and an Si cell from Solid State Radiations, Inc. (Author)

AD-264 648 Div. 6, 12
(TIPSE/DLW) OTS price $5.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DETERMINATION OF ORBITAL ELEMENTS AND REFRACTION EFFECTS FROM SINGLE PASS DOPPLER OBSERVATIONS,
by R. B. Patton, Jr. and V. W. Richard. June 61, 57p. incl. illus. (BRL memo. rept. no. 1357)
(Army Proj. 503-06-011)
Unclassified report

Presented at the Symposium on Space Research, Florence, Italy, Apr 1961.

DESCRIPTORS: (*Satellite vehicles, *Orbital flight paths, Detection, Measurement, Mathematical prediction, Determination.) (*Doppler tracking, Doppler radar, Radar signals, Radio signals, *Radar tracking, Doppler systems, Radar equipment, Data processing systems, Radiofrequency filters, Phase measurement, Design, Effectiveness.) (Radar reflections, Atmospheric refraction, *Ionosphere, Electrons, Measurement.) Symposia.

A method is presented for the determination of the orbital elements of a satellite by observing, in the course of a single pass, the Doppler shift in the frequency of a radio signal which is either transmitted or reflected from the satellite. The method of solution consists of applying a series of differential corrections to a compatible set of approximations for the initial position and velocity components. Techniques for determining these approximations with sufficient accuracy to initiate the computation are discussed. The method was developed for the DOPLOC tracking system which employs a narrow bandwidth, phase-locked, tracking filter. The latter has been designed to minimize random errors in Doppler frequency measurements derived from weak signals transmitted over extreme ranges. (Author)

AD-264 688 Div. 6, 30
(TIPSE/DLW) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PACKAGING OF A HYPERVELOCITY RADIO TELEMETER TO WITHSTAND HIGH IMPULSE ACCELERATIONS,
by Raymond Young. Oct 61, 34p. incl illus. tables (Rept. no. AEDC TN 61-119)
(Contract AF 40(600)800, Proj. 8952)
Unclassified report

Presented at the Electronic Circuit Packaging Symposium, Boulder, Colo., Aug 1961.

DESCRIPTORS: (*Telemetering transmitters, Oscillators, Transducers, Oscillator circuits, Transistors, Pressure transmitters, Radiofrequency oscillators, Containers, *Packaging, Encapsulation, Mounting brackets.) (Hypervelocity guns, Hypervelocity projectiles, Test equipment, Acceleration, Pressure, Stability, Test methods.) (Telemetering transmitters, Frequency shift, Reduction.) Test facilities, Test equipment, Telemetering transmitters.

Telemeter transmitters, consisting of simple r-f oscillators incorporating variable-capacitance pressure transducers, operated successfully in aeroballistic ranges after gun launchings at peak accelerations of 100,000 g. Telemetered pressure data obtained from these telemeters after launchings at 200,000 g, however, were very inaccurate, partly as a result of the frequency shifts of the oscillators. Tests, devised to determine the cause of these shifts, showed that a single, most favorable, mounting orientation for each of the components exists. If the components are oriented properly, frequency shifts can be minimized. It was also found that launching a complete oscillator without the transducer does not necessarily allow a prediction of the behavior of the individual circuit components. It was proven possible for each of the oscillator circuit components to change its electrical value with no resulting change in oscillator center frequency. (Author)

7. ELECTRICAL EQUIPMENT

AD-263 905 Div. 7, 13
(TIPSM/BRW) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
UNFUELED POWER SUPPLY FOR ISOLATED BASES ON SEA ICE.
by C. W. Terry. 12 Oct 61, 19p. incl. illus. table, 10 refs. (Technical rept. no. 163)
Unclassified report

DESCRIPTORS: Ice islands, Naval shore establishments, *Arctic regions, *Power supplies, Electric power production, Feasibility studies, Thermoelectricity, Temperature, Air, Sea water, Generators, Wind, Solar cells, Tests, Test equipment.

The feasibility of an unfueled power supply for use at isolated bases on sea ice was considered. Three sources of power which do not require fuel were investigated to determine whether their use might be practical: (1) the temperature differential between the water under sea ice and the air above the ice, (2) wind-driven generators, and (3) solar energy cells. A review of theory and the results of a laboratory test showed that a device depending on temperature differential is not a practical answer because of ice formation on the evaporator. A literature search showed that windmills have been used satisfactorily under somewhat similar circumstances; it appears that they would give adequate power for at least part of the bases under consideration. The literature search also showed that solar energy cells should operate satisfactorily during the seasons having long hours of sunlight. A further study of these two possibilities is recommended. (Author)

AD-263 973 Div. 7, 26, 8
(TIPSE/DLW) OTS price $7.60

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 10, 25 May-25 Aug 61,
by J. B. Rawls. 25 Aug 61, 74p. incl. illus. tables.
(Contract DA 36-039-sc-81268)
Unclassified report

DESCRIPTORS: (*Paper capacitors, Metal films, Thin films, Metal coatings, Varnishes, Production, Processing, Quality control, Design, *Manufacturing methods.) (Capacitors, Electrical properties, Resistance, Reliability, Life expectancy, Non-destructive testing, Tests.) Films.

Effort was directed primarily towards the testing and production of preproduction samples for 0.1, 1.0 and 5.6 uf capacitors. Preproduction samples of the 0.1 uf and 1.0 uf sizes passed all tests required for preproduction approval. The 5.6 uf preproduction samples were manufactured and process testing is continuing. Preparations were continued for the production of the pilot run samples. (Author)

AD-264 021 Div. 7
(TIPSE/WAW) OTS price $11.00

Naval Postgraduate School, Monterey, Calif.
BACKLASH IN SECOND ORDER FEEDBACK CONTROL SYSTEMS,
by George J. Thaler, N. O. Anderson, Jr. and others. Sep 61, 146p. incl. illus. tables.
(Technical rept. no. 19)
(Sponsored by the Office of Naval Research)
Unclassified report

DESCRIPTORS: (*Servo systems, *Control systems, *Feedback, Errors, Mathematical analysis, Stability, Transients.) (Digital computers, Programming.) (Gears, Plasticity, Elasticity.)

Some initial results in a long range project to study the backlash phenomena quantitatively are presented. The ultimate goal is to provide charts which will be useful in the engineering analysis and design of feedback control systems involving backlash. The study of backlash in this report is restricted to second order systems only, so as to provide a firm foundation for future studies while limiting the variable parameters to a variety which makes numerical calculations feasible. In like manner the mechanical parameters are restricted to inertia (mass) and viscous friction. It is recognized that the mechanical inertia and viscous friction may be subdivided and appear on both sides of the backlash in varying proportions; such cases are considered in detail. It is also recognized that the gear tooth surfaces must hit each other after the meshing gears have gone through the dead space (backlash), and this impact may be either plastic or elastic; this effect is also studied in detail. The investigations reported are based solely on the phase plane-phase space technique. (Author)

AD-264 135 Div. 7, 25
(TIPSE/DLW) OTS price $1.60

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH ON THE EFFECTS OF MAGNETIC FIELDS ON THERMIONIC POWER GENERATION.
Progress rept. no. 1,
by Alfred Schock. 2 Oct 61, 14p. incl. illus.
(Rept. no. RAC 458; PPL TR 61-22)
(Contract Nonr-328500)
Unclassified report

DESCRIPTORS: (Generators, *Power supplies, *Thermionic emission, *Magnetic fields, Magnetic effects, Electric power production, Alternating current, Design.) (Electromagnets, Test equipment, *Diodes, Cesium, Cathodes (Electron tubes), Anodes (Electron tubes), Tests.) Electric propulsion.

Research is concerned with a theoretical and experimental study of magneto-thermionic power generation. This concept promises a number of advantages over conventional thermionic generators. Low pressure cesium diodes suffer from an undesirable size limitation, because self-induced magnetic fields reduce current transmission and hence, efficiency. Although this effect does not arise in the small devices tested to date, it becomes important in building larger generators. Analysis indicates that this problem can be virtually eliminated by the application of a longitudinal magnetic field. An experimental and theoretical study was initiated to verify the predicted magnetic field effects, and to examine their possible use in AC generation. (Author)

AD-264 218 Div. 7, 12
(TIPSM/BRW) OTS price $3.60

Gulton Industries, Inc., Metuchen, N. J.
SILVER-CADMIUM BATTERIES.
by Guy Rampel and R. C. Shair. June 61, 34p. incl. illus. 29 refs.
(Contract AF 33(600)42397)
(WADD TR 61-131) Unclassified report

DESCRIPTORS: (*Storage batteries, *Alkaline cells, Silver electrodes, *Silver compounds, Oxides, *Cadmium, Electrodes, Battery separarators, Design, Space environmental conditions, Military requirements, Bibliography.) (Electrodes, Preparation, Metal plates, Nickel, Porous metals, Impregnation, Silver compounds.)

Efforts leading to improved, long life, reliable, high whr/lb, sealed Ag-Cd batteries were initiated. A comprehensive literature survey has been conducted. Included are all items of interest relative to previous development effort and their current capabilities. Data are given on special silver oxide-electrodes and comparison data on a commercial plate. Design recommendations for meeting the desired performance requirements are proposed and discussed. (Author)

AD-264 264 Div. 7, 4
(TIPSM/REB) OTS price $1.60

Alfred U., N Y.
FUEL CELL ELECTRODE PROCESSES.
Final rept.,
by George J. Young and Ralph B. Rozelle. Sep 61, 12p. incl. illus. tables.
(Contract Nonr-150303)
Unclassified report

DESCRIPTORS: (*Fuel cells, *Electrodes, *Hydrogen electrodes, *Oxygen electrodes, Chemical reactions.) (Electrolytes, Sodium compounds, Potassium compounds, Hydroxides.) (Potassium compounds, Carbonates.) (Electrodes, Electric potential, Measurement.) (Catalysts, Metals, Alloys, Preparation.) (Electrochemistry, Power supplies.)

A brief summary is given of the study of fundamentals of fuel cell anode processes, particularly with the use of carbonaceous fuel gases, and suitable electrode structures to carry out such studies. The particular fuel cells investigated were low temperature, low pressure cells with aqueous alkaline electrolytes. The hydrogen anode in alkaline electrolytes was investigated in more detail than electrodes employing other fuel gases. A complete study of the catalytic activity of the group's VIII and Ib metals and some of their alloys in establishing the open circuit potential was made. Tungsten metal and the oxides of the 3d transition series were later included. The potential of the hydrogen anode as a function of the metal catalyst employed was tabulated. All of these are half-cell potentials and are referred to the normal hydrogen electrode which has an arbitrary potential of zero and are expressed as oxidation potentials. (Author)

AD-264 284 Div. 7, 31
(TIPSM/EJH) OTS price $4.60

Navy Electronics Lab., San Diego, Calif.
CURRENT RATING OF SHIPBOARD WIRE,
by A. M. Samborsky and C. J. Van Vliet.
18 July 61, 49p. incl. illus. (NEL rept. no. 1055)
Unclassified report

DESCRIPTORS: (*Electric cables, *Electric wire, Electrical conductance, Electric currents, Temperature, Heat transfer, Mathematical analysis.) (Electric currents, Specifications, Standards, Standardization for Electric cables in Ships, Naval vessels.)

Division 7 - ELECTRICAL EQUIPMENT

Effort was made to establish a method for current rating of cable or bundles of insulated wire. Specifically, to (1) devise a method of computing the maximum current which a bundle of wire may carry without exceeding a predetermined temperature, and (2) describe a simple method of predicting the temperature rise when the load is given. Temperature rise and load capacity can be determined using available mechanical data. A factor called cable efficiency is introduced to allow a mechanical analogy. The mechanical analogy is then solved to yield current capacity. (Author)

AD-264 302 Div. 7, 25
(TIPSM/EJH) OTS price $4.60

Eagle-Picher Research Labs., Miami, Okla.
INVESTIGATION OF INTEGRALLY COMPOSED VARIABLE ENERGY GAP PHOTOVOLTAIC SOLAR ENERGY CONVERTER.
Semiannual technical rept. no. 1, 9 Feb-10 July 61,
by L. E. Stone and W. E. Medcalf. 10 July 61, 42p. incl. illus. tables.
(Contract DA 36-039-sc-87408)
(ARPA Order no. 80-61)
Unclassified report

DESCRIPTORS: (*Photoelectric cells, *Solar cells, *Semiconductors, Electrical properties, High temperature research, Feasibility studies, Manufacturing methods.) (Semiconductors, *Intermetallic compounds, *Gallium compounds, *Phosphides, Preparation.) (Semiconductors, *Intermetallic compounds, *Gallium compounds, *Arsenides.) Solid state physics, Test equipment.

GaP as a discrete phase was produced by the diffusion of P into GaAs. Concentration of discrete phase GaP in diffused powder was determined by x-ray studies to be 82.3 percent, with GaAs determined as 17.7 percent. An advantage of variable gap GaP-GaAs cells over single gap GaAs cells is indicated in elevated temperature characteristics, particularly in Isc change. Zn diffusion by the open tube H technique offers excellent junction depth control and expedites fabrication over the sealed ampoule techniques. Reliable ohmic contacts to p type GaAs can be produced by sputtering with Pt followed by coating with solder or baking on Ag paste. (Author)

AD-264 309 Div. 7, 4
(TIPSM/SEB) OTS price $3.60

General Electric Co., Lynn, Mass.
RESEARCH ON LOW TEMPERATURE FUEL CELL SYSTEMS.
Progress rept. no. 16, 15 Feb-15 May 61.
15 May 61, 37p. incl. illus.
(Contract DA 44-009-eng-3771)
Unclassified report

DESCRIPTORS: (*Fuel cells, Catalysts, Electrodes, Electrolytes, Design, Tests, Low temperature research.) (*Electrodes, Platinum, Palladium, Ruthenium, Rubidium, Iridium.) (*Anodes, Chemical reactions, Oxidation, Ethylenes, Platinum.) (Catalysts, Powder metals, Nickel, Gold, Silver, Platinum alloys, Rhodium, Rhodium alloys, Platinum, Palladium, Preparation, Effectiveness.) Electrochemistry, Catalysis, *Power supplies.

Qualitative information was obtained concerning the intermediates in the oxidation of ethylene on Pt in acidic and alkaline electrolyte systems. An approximate activation energy for the electrochemical oxidation of ethylene was obtained. Several high area noble metal electrocatalysts were prepared by a new technique and their properties partially evaluated in fuel cells. An ultra area Ni has given fuel cell performance almost equal to that of Pt black above the emf for Ni oxidation. Preliminary experiments were performed in connection with CO2 rejection from alkali metal carbonate solution electrolytes. Marked pH gradients develop in these electrolytes during the operation of cells. (Author)

AD-264 396 Div. 7, 15, 30
(TIPSP/MFA) OTS price $1.60

New York U. Coll. of Engineering, N. Y.
THE GEOMETRY OF REPRESENTATIONS FOR ACTIVE NETWORKS.
Scientific rept. no. 1,
by D. J. R. Stock and L. J. Kaplan. 26 May 61, 12p. incl. illus. (Technical rept. no. 400-35)
(Contract AF 19(604)7486)
(AFCRL 544) Unclassified report

DESCRIPTORS: (*Geometry of *Electrical networks by Impedance, *Electromagnetic wave reflections, Scattering.) (Curve fitting, Transformations (Mathematics), Real variables.)

A graphical representation of active network elements is treated. A discussion of previous representations is given, together with a discussion of their interrelation. The problem of scattering matrix normalization for active networks is also considered. (Author)

AD-264 419 Div. 7, 4
(TIPSE/DLW) OTS price $3.60

Radio Corp. of America, Somerville, N. J.
HIGH CAPACITY MAGNESIUM BATTERIES.
Quarterly progress rept. no. 4, 1 Mar-31 May 61,
by G. S. Lozier and R. J. Ryan. 31 May 61, 31p. incl. illus. table.
(Contract DA 36-039-sc-85340, Proj. 3G-18-03-001)
Unclassified report

DESCRIPTORS: (*Primary batteries, *Power supplies, *Dry cells, Magnesium, Magnesium compounds, Perchlorates, Mercury compounds, Oxides, Lithium compounds, Copper compounds, Silver compounds, Magnesium electrodes, Electrolytes, Design, Tests.) (Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Electrolytic cells, Measurement.)

Data is presented which shows the beneficial effects on reserve cell initial voltage characteristics by the addition of silver (I) oxide to the mercuric oxide cathode mix. Watt hour capacity data for a five-ampere-hour Mg/Mg(ClO4)2/HgO reserve cell is summarized at the thirty minute rate. Data at -4 and -40 F is also included. Conductivity studies of magnesium perchlorate and lithium perchlorate solutions as a function of temperature were carried out over a temperature range of +75 F to -45 F. Anode efficiencies of AZ-21XA magnesium in 2N Mg(ClO4)2 with 1.0 g LiCrO4 and 0.5 g Mg(OH) per liter are summarized for various continuous and intermittent tranceiver type drains. Comparison of discharge characteristics of Mg/Mg(ClO4)2/MnO2 (Type M) and Mg/Mg(ClO4)2/CuO A-size cells with AZ-10 and AZ-21XA magnesium alloy is given. (Author)

AD-264 505 Div. 7
(TIPSE/DLW) OTS price $12.00

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
HIGH-VOLTAGE DIRECT-CURRENT CAPACITANCE MACHINES, by L. S. Polotovskiy. 18 Sep 61, 165p. incl. illus. tables, 138 refs. (Trans. no. MCL-1398 of Yemkostnyye Mashiny Postoyannogo Toka Vysokogo Napryazheniya, Moscow:pp. 154, 1960)
Unclassified report

DESCRIPTORS: (*Electromechanical converters, *Electric power production, Power supplies, Direct current, Electrostatic capacitance, Electrostatic generators, Electrostatics, Inductance, Electric fields, *Generators, Electrical equipment, Design, Theory.) (Technological intelligence, Translations, USSR.)

The transmission of high-voltage d-c power, the peaceful use of atomic energy, the vast development of radio engineering, and the introduction of automatic industrial processes, have made necessary the quest for new methods of converting mechanical energy into high-voltage d-c power in generators, and the opposite conversion in motors. An examination is made of high-voltage d-c capacitance machines to classify these machines and give their general theory, and to evaluate the possibilities of creating capacitance machines with high specific power and efficiency. The characteristics of various types of machines operating as generators and motors are considered. Conditions of self-excitation, commutation, and operation of capacitance machines in various specific systems are discussed. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-263 900 Div. 8, 25
(TIPSP/WH) OTS price $2.60

Kiruna Geophysical Observatory (Sweden).
FADING RATE OF AURORAL REFLECTIONS AT 92.8 Mc/s,
by Alv Egeland.
25 Apr 61, 29p. incl. illus. 17 refs. (Scientific rept. no. 4)
(Contract AF 61(052)418)
(AFCRL-726) Unclassified report

DESCRIPTORS: (*Aurorae, *Electromagnetic wave reflections, Radio waves, Very high frequency, Attenuation.) (Statistical analysis, *Statistical functions, Wave analysis, Electromagnetic waves, Reflection, Correlation techniques.) (Wave transmission, Radio waves, Radio transmitters, Amplitude modulation.) Sweden.

The frequency properties of 92.8 mc cw transmissions propagated via oblique auroral reflections were subjected to statistical analysis. The purpose was to determine the fading rate of auroral reflections at 92.8 mc. Additional information was obtained concerning the random velocity of the auroral irregularities. The auroral fading records showed a Rayleigh amplitude distribution, i.e., the auroral echoes consisted of a large number of scattered wavelets and no major specularly reflected portion of the transmitter waves was received. The distribution of the differences between two consecutively sampled amplitude values fell fairly close to a Gaussian curve. Autocorrelation functions showed that signals often remained significantly correlated for about 0.005 sec, which points to substantial fading frequency up to about 200 c. In most of the 100 power spectra obtained, fading frequencies up to 300 or 400 c were found, but the power in the range of 0-100 c was clearly dominant. The root mean square value for the random velocity of the auroral irregularities, calculated from the autocorrelation functions of the amplitude, was found to vary between 100 and 220 m/s. (Author)

AD-263 902 Div. 8, 25
(TIPSP/WH) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DISTRIBUTION OF ELECTRONS IN THE F REGION,
by J. V. Evans. 15 Sep 61, 35p. incl. illus.
(Rept. no. 30G-0014)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Ionosphere, Electrons, Distribution, Density, *Electromagnetic wave reflections.) (*Radar signals, Scattering, Reflections.) (*Radar antennas, Echo ranging, Radar echo areas.)

Electron density measurements throughout the F region of the ionosphere are discussed. The measurements were made by the incoherent backscatter technique at the Millstone Hill Radar Facility. Most of the observations were made late in 1960, and all of them were made during the daytime. The shape of the profiles obtained is examined in relation to current theories for the ionosphere, and it is found that the observed profiles in general have a form predicted by the theory presented by Yonezawa (Radio Res. Labs., Japan, 7:355, 1960.) (Author)

AD-263 904 Div. 8, 25
(TIPSP/WH) OTS price $1.60

Linfield Research Inst., McMinnville, Oreg.
FIELD EMISSION RESEARCH.
Quarterly status rept. no. 10, 1 Aug-1 Nov 59,
by R. W. Strayer. 23 Dec 59, 11p. incl. illus.
(Contract Nonr-234100)
Unclassified report

DESCRIPTORS: (*Field emission, *Cathodes, Heating.) (Electric fields, Electric currents, Electrons, *Tungsten.) Electrodes.

A qualitative study of surface migration of tungsten atoms on tungsten under high electrical stress was carried out. This study involved the observation of the changes in the field emission pattern of a tungsten emitter when operated under high temperature and high dc field conditions. Further development of an automatic ring counter for use as a tool in surface migration studies was carried out and such a ring counter was incorporated into the surface migration work at this laboratory. (Author)

AD-263 923 Div. 8, 30
(TIPSE/RD) OTS price $7.60

Norwegian Defence Research Establishment.
OPTIMIZATION OF RF VOLTAGE AMPLITUDES AND GAP SPACING OF GENERALIZED FLOATING DRIFT-TUBE OSCILLATORS,
by Kjell Blotekjaer. June 61, 72p. incl. illus. tables (Technical note no. 4)
(Contract AF 61(052)264)
(RADC TN 61-210) Unclassified report

DESCRIPTORS: (*Klystrons, *Microwave oscillators, Cavity resonators, Electrical properties, Measurement, Electron tube oscillators.) (Linear accelerators, Electron beams, Electric fields.) Norway.

Research concerns the generalized floating drift-tube oscillator which is a monotron oscillator with an interaction region characterized by a number of narrow gaps separated by drift-tubes. Research was conducted to determine the configurations of gap voltages and drift engths yielding maximum conversion efficiency. The maximum efficiency increases with the length of the interaction region, but depends very little on the number of drift-tubes. Many different configurations yield efficiencies close to the maximum. The highest calculated efficiency is 69.3 per cent for a six-gap oscillator having a total drift angle of 12 cycles. For very long interacttion regions the numerical method failed. For the sake of comparison configurations with equal gap voltages and equal drift lengths are considered, and shown to yield small-signal electronic conductances close to the maxima, whereas the efficiencies are considerably lower than those associated with the optimum configurations. For a special case (6 gaps) an equivalent continuous RF field distribution was investigated. The efficiency is only slightly different. (Author)

AD-263 937 Div. 8
(TIPSE/DLW) OTS price $7.60

New York U. Coll. of Engineering, N. Y.
STUDY OF SHORT TERM STABILITY OF CRYSTAL OSCILLATORS.

Rept. no. 4 (Final), 1 July 60-30 June 1,
by James Rarity, Lester Saporta, and Gerald Weiss.
30 June 61, 73p. incl. illus. 161 refs.
(Contract DA 36-039-sc-85376, Proj. 3A-99-15-001)
Unclassified report

DESCRIPTORS: (*Crystal oscillators, *Frequency stabilizers, Stability, Measurement, *Bibliography.) (Oscillators, Frequency multipliers, *Frequency analyzers, Phase measurement, Test equipment, Test methods.) (Frequency, Standards, Errors, Statistical analysis, Tests, Sources, Noise (Radio), Signal-to-noise ratio.)

Research was concerned with the factors underlying the short term stability of crystal oscillators. A discussion is presented of a technique for measuring the frequency of a source in a short time interval. Design criteria are presented and sources of error are analyzed. A set of curves useful in the design of the measuring system is given. An analysis is also given of the effects of noise on the frequency of a source. Models based on the work of S. O. Rice and J. S. Bendat are discussed and some typical results calculated. Contained in the report is an extensive bibliography on: (1) frequency measurements, (2) frequency multipliers and dividers, (3) frequency standards and oscillators, (4) short time frequency stability, (5) piezoelectric parameters, (6) signal analysis, and (7) instantaneous frequency. (Author)

AD-263 938 Div. 8, 25
(TIPSE/CCD) OTS price $3.60

National Bureau of Standards, Washington, D. C.
ELECTRICAL PROPERTIES OF NON-STOICHIOMETRIC SEMICONDUCTORS,
by J. H. Becker and H. P. R. Frederikse.
1 Sep 61, 32p. incl. illus. (NBS rept. no. 7338)
(Sponsored by the Office of Naval Research)
Unclassified report

DESCRIPTORS: (Semiconductors, Transport properties, Electrical properties, Mathematical analysis, Integral equations, Measurement.) (Conductivity, Hall effect, Thermoelectricity, Temperature, Electrons, Density.)

The electrical conductivity, thermoelectric power, and Hall coefficient are examined as a function of the ratio of hole-to electron concentrations p/n for a non-degenerate semiconductor at constant temperature. From these relations the fundamental parameters of the material (forbidden band gap, mobilities and effective masses) can be derived. This approach is particularly applicable to materials whose stoichiometry varies as a function of temperature and vapor pressure of the constituents, P. For any model of this equilibrium decomposition, it is easy to transform the calculations in terms of p/n into results as a function of P. (Author)

AD-263 944 Div. 8, 15
(TIPSP/WH) OTS price $1.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
INESSENTIAL CONTACTS IN MINIMAL RELAY NETWORKS,
by L. Calabi and J. A. Riley. July 61,
9p. incl. illus. tables (Scientific rept. no. 1)
(Contract AF 19(604)7493)
(AFCRL-599) Unclassified report

DESCRIPTORS: (*Electrical networks, Microwave networks, Circuits, Applied mathematics.) (Mathematical analysis, *Special function, Matrix algebra, Algebraic topology.)

Two examples are presented of minimal series parallel contact networks containing an inessential contact. (Author)

AD-263 945 Div. 8, 15, 30
(TIPSP/WH) OTS price $4.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
MATHEMATICAL STUDY OF CODING TECHNIQUES AND OF MINIMIZATION PROBLEMS FOR SWITCHING CIRCUITRY.
Final rept.
Apr 61, 42p. incl. table.
(Contract AF 19(604)3471)
(AFCRL-317) Unclassified report

DESCRIPTORS: (*Electrical networks, Microwave networks, Circuits.) (Mathematical analysis, Applied mathematics, *Special functions, Matrix algebra.) (*Coding, Statistical analysis, Statistical distributions.) (*Bibliography, *Reliability, Circuits.)

The ten scientific reports and twenty two technical memoranda dealing with Boolean formulas and minimization problems and coding theory are summarized. A bibliography on reliability is presented. (Author)

AD-263 951 Div. 8, 25
(TIPSM/EJH) OTS price $3.60

Linfield Research Inst., McMinnville, Oreg.
SEVENTH FIELD EMISSION SYMPOSIUM, 31 AUGUST-2 SEPTEMBER 1960.
2 Sep 60, 32p.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: (*Field emission, *Symposia, *Cathode ray tubes, Microscopes, *X-ray generators, Ions, Electrons, Sources, Tungsten, Silicon, Germanium, Ionization, High temperature research.) (*Cathode ray tubes, Chemical impurities, Adsorption, Degasification, Semiconductors.) (*Tungsten, *Platinum, Ions, Alpha particles, Radiation effects.) (*Single crystals, Work functions, Measurement.) (*Tungsten, *Molybdenum, Chemical impurities, Gases, Oxygen, Nitrogen, Carbon compounds, Monoxides, Acetylenes, Films, Mass spectroscopy, Adsorption, Field emission.)

AD-263 957 Div. 8
(TIPSM/BRW) OTS price $8.60

Syracuse U. Coll. of Engineering, N. Y.
SELF-REPAIRING MACHINES. PART ONE.
Final rept. pt. 1,
by Earl J. Kletsky. 1 June 61, 94p. incl. illus. tables, 21 refs. (Rept. no. EE759-614F1)
(Contract AF 30(602)2234)
(RADC TR 61-91A) Unclassified report

DESCRIPTORS: (*Electronic systems, Electronic circuits, Electronic equipment, Electronic relays, Electronic switches, Reliability, Maintenance, Failure (Mechanics), Detection, Diagnosis, Automation, Mathematical analysis, Theory.)

As electronic systems continue to grow in size and complexity, the related problems of system reliability and maintenance have become a matter of prime concern. Since existing methods for improving reliability seem inadequate to meet the requirements demanded by future systems, it appears appropriate to explore and develop new techniques and methods. A study of the self-regenerating properties of biological systems suggests that the concept of self-repair may be applicable to the problem at hand. In a self-repairing system, external maintenance is eliminated. Upon detection of a malfunction, the system itself initiates action which repairs or replaces the faulty component. The system model employed in this work consists of an arbitrary interconnection of a finite number of elements. An element is defined as the smallest replaceable unit within the system to which a failure is to be attributed. Thus, depending on the system, an element may be as small as a resistor or micromodule, or as large as an entire sub-assembly. Element failures are assumed to be independent. (Author)

AD-263 958 Div. 8
(TIPSM/EJH) OTS price $1.60

Rome U. (Italy).
AN EXACT MODAL SOLUTION FOR A RECTANGULAR GUIDE LOADED WITH LONGITUDINALLY MAGNETIZED FERRITE,
by Giorgio Barzilai and Giorgio Gerosa. 2 Jan 61, 21p. incl. illus. (Technical note no. 3)
(Contract AF 61(052)101)
(AFCRL-737) Unclassified report

DESCRIPTORS: (Electromagnetic waves, *Wave transmission, *Waveguides, Design, Metal plates, Magnetic materials, Ferrites, Theory, Mathematical analysis).

An exact modal solution for a rectangular guide partially or completely filled with a slab of longitudinally magnetized ferrite is given as a superposition of modes of the parallel plate guide loaded with ferrite magnetized in a direction parallel to the walls. A numerical case relative to a guide completely filled with longitudinally magnetized ferrite is solved. Diagrams showing the field distribution are given. (Author)

AD-263 961 Div. 8
(TIPSM/BRW) OTS price $3.60

Syracuse U. Coll. of Engineering, N. Y.
SELF-REPAIRING MACHINES. PART TWO.
Final rept. pt. 2,
by Sundaram Seshu. 1 June 61, 34p. incl. illus. tables (Rept. no. EE759-614F2)
(Contract AF 30(602)2234)
(RADC TR 61-91B) Unclassified report

DESCRIPTORS: (*Electronic systems, Electronic circuits, Electronic equipment, Electronic relays, Electronic switches, Sequence switches, Reliability, Maintenance, Failure (Mechanics), Detection, Diagnosis, Automation, Feasibility studies.) (Digital computers, Programming.)

The feasibility of self-repairing systems is examined. The system considered is strictly electronic and repair is by replacement. The primary emphasis is on the diagnosis function and the feasibility of self-diagnosing systems. This phase of the project has not yet reached the point where definite theoretical conclusions can be drawn. The only engineering conclusion that can be drawn from the examples is that self-repairing systems are extremely difficult to design, if not impossible. As a by-product of the effort, much has been learned about the diagnosis and diagnosability of sequential switching circuits. (Author)

AD-264 013 Div. 8
(TIPSE/RD) OTS price $7.60

Linfield Coll., McMinnville, Oreg.
RESEARCH IN FIELD EMISSION AND ITS APPLICATION.
Final rept., 5 Nov 48-30 Apr 57,
by W. W. Dolan. May 57, 67p. incl. illus. tables, 30 refs.
(Contract N8onr-72401, Proj. NR 072-171)
Unclassified report

DESCRIPTORS: (*Field emission, Theory, Tests, Stability.) (Surfaces, Microscopy, Electron microscopy, Diffusion.) (Manufacturing methods of Cathodes, X rays, Rectifiers, Transducers, Amplifiers.) (Amplifiers, X band.) Electron optics, Space charges.

Emission of electrons from metals in the presence of large values of the surface electric field, with and without the added effect of temperature, has been investigated in three broadly defined phases: (1) a study of basic field emission phenomena, (2) development of methods for stabilizing the emission current and prolonging the useful life of field cathodes, and (3) investigation of possible application of the field emission process to useful electronic devices. Reported aspects of the first phase include an experimental test of field emission theory, the effects of space charge, emitter temperature, and surface diffusion, the termination of emission through a vacuum arc, and a preliminary study of field emission from semiconductors. In the second phase, stable life of the pulsed, heated field emitter has been extended to more than 1000 hours through improved techniques developed in an extensive life test program still in progress. In the third phase, design and preliminary application of several devices have progressed to the point of justifying specific development programs under other support. Throughout the entire range of the studies, such procedures as emitter fabrication, vacuum techniques, electron microscopy of emitter geometry and pulse operation have been refined and reduced to standard practice. (Author)

AD-264 019 Div. 8, 5
(TIPSE/DLW) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
TIME DOMAIN ANTENNA TECHNIQUES.
June 61, 41p. incl. illus. table (Rept. no. TM-686)
(Contract AF 30(602)2410)
(RADC TN 61-145) Unclassified report

DESCRIPTORS: (*Slot antennas, Coupled antennas, *Antenna radiation patterns, Electromagnetic wave reflections, Lobing, Reduction, Time, Modulation, Errors, Statistical analysis, Measurement.) (Radio communication systems, Antennas, Effectiveness.) (Antennas, Test facilities, Test equipment.)

Research was concerned with the application of time modulation of array antennas to the problem of obtaining ultra-low sidelobe antenna patterns. The question of synthesizing low sidelobe patterns using two side-by-side arrays is investigated and these investigations, together with error analyses, indicate that it is preferable to use a single array whose aperture excitation coefficients are time modulated. For the measurement of ultra-low sidelobe antenna patterns it is necessary to have a pattern range free from even extremely small extraneous reflections. The method and results of measurements to determine the quality of the antenna pattern range are presented. These indicate that it will probably be possible to measure 40-db sidelobes to within + or - 1 db. (Author)

AD-264 035 Div. 8, 25, 2
(TIPSP/WH) OTS price $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
EXPERIMENTAL PROGRAM TO DETERMINE PROPERTIES OF IONIZATION WHICH IS PRODUCED BY SPACE VEHICLES. Final rept.
30 June 61, 18p. incl. illus. 25 refs. (Rept. no. 1108-6)
(Contract AF 19(604)7274)
(AFCRL-751) Unclassified report

DESCRIPTORS: (*Gas ionization in Ionosphere by *Satellite vehicles and *Spaceships.) (Electrons, Density of Measurement by *Radio transmission and Radio signals.) (*Ionospheric disturbances, Solar flares, Terrestrial magnetism, Magneto-optic rotation.) (Radar signals, Radar echo areas.) Ionosphere.

Research on determining the density, duration, and extent of ionization produced in the ionosphere by artificial satellites and space vehicles is summarized. Theoretical analysis of single-frequency artificial earth-satellite radio transmissions provided basic equations and methods for gaining information concerning the electron density at the satellite. Analyses of such phenomena as magnetic disturbances, ionospheric irregularities, and satellite signal scintillation were accomplished. Other studies, such as expected high-frequency reflection from suggested distributions around the satellite, were evaluated. The ionosphere seems to possess irregularities that sometimes scintillate the signal from the satellite so greatly that it is impossible to measure the rate of Faraday rotation. This scintillation has a high degree of correlation with spread F and sporadic E, but only a low amount of correlation with magnetic and solar indices. More research is needed on the electron density of the ionosphere and its variations. There appears to be a possibility that satellite-ionosphere interactions, especially during periods at high geomagnetic activity, will create a disturbance having a large radar echo area. (Author)

AD-264 042 Div. 8, 30
(TIPSE/RD) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE MEASUREMENT OF ARBITRARY LINEAR MICROWAVE TWO-PORTS,
by Helmut M. Altschuler. 27 July 61, 32p. incl. illus. tables (Rept. no. PIBMRI-935-61)
(Contract AF 18(600)1505)
(AFOSR-1169) Unclassified report

DESCRIPTORS: (*Microwave networks, Measurement, Linear systems, Microwave equipment.) (Microwaves, Scattering.) (*Microwave bridges, Interference, Measurement.) Microwave probes, Mathematical analysis, Errors.

The measurement of the scattering parameters of linear, but otherwise arbitrary, two-ports (active, lossless or dissipative and reciprocal or non-reciprocal) by means of an interference bridge is described. Since the measured data form circular loci from which the parameters are then derived, known precision curve fitting techniques are applicable. The various loci which may occur and their characteristics are discussed together with the methods available for distinguishing the proper locus from its inverse. Various methods of balancing the bridge and many of the errors associated with bridge balancing are given. Finally, the deliberate use of bridge imbalance for increasing measurement accuracy is considered. (Author)

AD-264 055 Div. 8
(TIPSE/DLW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
SYNCHRONIZATION OF A SELF-EXCITED OSCILLATOR WITH RADIO PULSES,
by E. S. Voronin and G. N. Berestovskii, tr. by A. R. Kraiman. June 61, 31p. incl. illus. tables (Rept. no. STL-TR-61-5110-25, Trans. from Radio Engineering (USSR), 11:34-40, 1956)
Unclassified report

DESCRIPTORS: (*Harmonic oscillators, Frequency multipliers, *Radiofrequency pulses, Generators, Signal generators, Synchronizers, Oscillation, Theory, Tests.) (Technological intelligence, USSR, Translations.) Oscillators.

The process of synchronizing a generator of harmonic oscillations with rectangular radio pulses is investigated theoretically and experimentally. The calculation of the processes of stabilizing the phase and amplitude of self-oscillations in a generator is presented. The results are verified experimentally for a frequency of one megacycle and agreement with theoretical derivations is obtained. It is shown that the settling time depends strongly on the initial phase. (Author)

AD-264 062 Div. 8, 25
(TIPSE/RD) OTS price $8.60

Texas Instruments, Inc., Dallas.
RESEARCH ON SEMICONDUCTOR SINGLE-CRYSTAL CIRCUIT DEVELOPMENT.
Technical note for 1 Aug 60-31 Jan 61,
by Arthur D. Evans. Sep 61, 95p. incl. illus. tables (Rept. no. 03-61-65)
(Contract AF 33(616)6600, Proj. 4159)
(ASD Technical note no. 61-120)
Unclassified report

DESCRIPTORS: (*Semiconductors, Electrical properties, *Single crystals, Materials.) (Transistors, Audio amplifiers, Band-pass amplifiers, Oscillators, Video amplifiers, Pulse generators.) (Electronic circuits, Manufacturing methods.)

Progress is reported in creating electronic circuits in and on single-crystal semiconductor material, and the processes investigated and employed in achieving this goal. Work has been

done on the unipolar field-effect transistor (UNIFET), the bipolar field-effect transistor (BIFET), an induced-channel field-effect transistor (INDUCHAFET), low-level audio amplifiers, a 1-watt-output audio amplifier, a bandpass amplifier (455 kc), a fixed-frequency oscillator, variable-frequency oscillators, multivibrators, a ring counter, a variable-frequency, variable-pulse-width pulse generator, and a video amplifier. Fabrication techniques for experimental units are discussed. (Author)

AD-264 146 Div. 8
(TIPSE/DLW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE STABILITY OF PULSE-WIDTH MODULATED AUTOMATIC CONTROL SYSTEMS,
by N. N. Pechorina, tr. by Z. Jakubski. Jan 61, 11p. incl. illus. tables (Rept. no. STL-TR 61-5110-3, Trans. from Izvestiya Akademii Nauk SSSR, Energetika i Avtomatika, No. 2, 1960)
Unclassified report

DESCRIPTORS: (Control systems, Automatic, *Pulse modulation, Stability, *Harmonic analysis, Nonlinear systems, Functions, Bessel functions, Fourier analysis.) (Technological intelligence, Translations, USSR.) (Data, Sampl ng, *Control systems.)

A harmonic analysis is presented of the modulator output for a sinusoidal input. This output is represented as a Fourier series whose coefficients are determined in terms of pulse amplitude, pulse duty cycle, and maximum pulse width. The basic assumption in the analysis is that phase shifts between the input sinusoids and the pulse train were not taken into account. The method of harmonic balance is used in an approximate stability analysis of a pulse width modulated sampled data control system. A complex transfer coefficient for the pulse-width modulated control system is defined in terms of the input amplitude and frequency. This enables amplitude and phase versus frequency characteristics to be determined for various input amplitudes of a pulse width modulated control system is presented with a numerical example. (Author)

AD-264 151 Div. 8
(TIPSE/DLW) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
LIMIT CYCLES IN PULSE-WIDTH MODULATED SYSTEMS,
by I. V. Pyshkin, tr. by Z. Jakubski. Aug 61, 27p. incl. illus. (Rept. no. STL-TR 61-5110-45, Trans. from Teoriya i Primenenie Diskretnykh Avtomaticheskikh Sistem, Transactions of the Conference Held in Moscow Sep 22-26, 1958, Acad. of Sci. USSR. Moscow, pp. 132-150, 1960)
Unclassified report

DESCRIPTORS: (*Control systems, Nonlinear systems, Sampling, *Pulse modulation, Frequency, Functions, Equations, Mathematical analysis.) (Technological intelligence, Translations, USSR.)

A general frequency domain approach is used for determining limit cycle characteristics in pulse-width modulated sampled-data control systems. The existence is determined of limit cycles using a describing function approach. In particular, if the sampling rate of the PWM and the frequency response characteristics of the continuous linear plant are given, the author indicates through use of several graphs how one may ascertain the existence of a limit cycle one-half and one-fourth of the sampling frequency. A brief discussion is given of the stability of limit cycles in pulse-width modulated control systems. No numerical illustrative examples are presented, however, it is indicated that an analog simulation was used to corroborate some results. (Author)

AD-264 154 Div. 8, 25
(TIPSP/WH) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
PROBABILITY DENSITIES FOR THE DURATION OF OVERSHOOTS IN FLUCTUATIONS,
by V. I. Tikhonov and I. N. Amiantov, tr. by Arthur R. Kraiman. Mar 61, 16p. incl. illus. tables (Rept. no. STL-TR 61-5110-14, Trans. from Radiotekhnika, Vol. 15, no. 9, 1960).
Unclassified report

DESCRIPTORS: (*Information theory, Communications theory, *Radio signals, Noise (Radio), Radio receivers, *Pulse communication systems.) (Radio signals, Density, Statistical analysis, Statistical distributions, Correlation techniques, Pulse discriminators.) (Translations, USSR, Technological intelligence, Pulse communication systems.)

Three approximate methods for calculating the probability densities for the durations of overshoots in normal stationary fluctuations are briefly examined and some experimental results are given. The regions of applicability of the various methods are shown by a comparison of the calculated probability densities with the experimental results. (Author)

AD-264 306 Div. 8, 26
(TIPSE/DLW) OTS price $11.00

Pacific Semiconductors, Inc., Culver City, Calif.
TRANSISTOR, VHF, SILICON, POWER (3w, 70mc).
Final progress rept., 21 Jan 60-21 May 61,
by S. H. Barnes, N. P. Burcham and others.
21 May 61, 142p. incl. illus. (PSI rept. no. 4000:6-1-F)
(Contract DA 36-039-sc-85255)
Unclassified report

DESCRIPTORS: (*Transistors, *Transistor amplifiers, Power amplifiers, Very high frequency, Silicon, Design, Processing, Production, *Manufacturing methods, Electrical properties, Reliability, Life expectancy, Storage, Tests, Test equipment.) Amplifiers.

The design of the transistor is reviewed, and the process procedures which resulted from the development program are described. The nature of the problems encountered is discussed, and the manner of their solutions is presented. Extensive performance data and reliability data are presented in graphical form and the circuitry of the special test fixtures is shown in schematic form. Test data and the distributions of electrical parameters for the 400 units delivered at the conclusion of the contract are included in the characterization studies. (Author)

AD-264 308 Div. 8, 12
(TIPSM/SEB) OTS price $8.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
STABILITY STUDIES OF QUARTZ CRYSTALS FOR SATELLITES.
Final rept., 10 June 60-30 June 61,
by R. B. Belser and W. H. Hicklin. 30 June 61, 78p. incl. illus. tables.
(Contract DA 36-039-sc-85363)
(ARPA Order no. 54-60)
Unclassified report

DESCRIPTORS: (*Quartz resonators, Very high frequency, Stability, Radiation effects, Storage.) (*Quartz crystals, Coatings, Metal coatings, Plating, Vapor plating, Aluminum coatings, Silver plating, Copper coatings.) (Frequency, Gamma rays, Measurement, Test methods, Test equipment.) Satellites.

Over 100 100-Mc AT-cut quartz resonators were made and stored at 0 C and 60 C or cycled through the temperature range 0 C to 60 C once daily. The units have consisted of resonators operated at the 5th, 7th, and 9th overtones and were plated with Ag, Al, or Cu. Frequency measurements have been made by a bridge and counter method. The standard frequency was derived from a bank of 3 oscillators monitored against the 18-kc signal of radio station NBA, Balboa, Canal Zone; an Atomichron served as a standby standard. The NBA signal was received in Atlanta, Ga., to an accuracy of 6 parts in 10 to the 10th power. The more stable units have been 9th overtone units coated with Ag. Several of these have held + or -5 parts in 10 to the 8th power more than 180 days. Radiation damage was conducted by exposure of 12 stable 9th-mode units to approximately 1 x 10 to the 6th power rad/hr. A dosage for 30 min at the highest intensity available resulted in a negative frequency shift of 5 to 10 ppm. Aging at 60 C thereafter was upward at a rate of about +2 x 10 to the -8th power per day. For a dosage of one hr at a lower intensity, more in agreement with that to be expected in the Van Allen Radiation Belt (2 x 10 to the 4th power rad/hr.), shifts of about -2 x 10 to the -7th were experienced. (Author)

AD-264 318 Div. 8
(TIPSE/DLW) OTS price $3.60

General Dynamics/Electronics, San Diego, Calif.
DEVELOPMENT OF A FIVE-GUN DUAL-PURPOSE CATHODE-RAY TUBE.
Final rept., 16 July 59-30 June 61,
by D. J. Haflinger. 30 June 61, 32p. incl. illus. tables.
(Contract DA 36-039-sc-78361)
Unclassified report

DESCRIPTORS: (*Cathode ray tubes, Electron guns, Design, Manufacturing methods, Specifications.) (Cathode ray tube screens, Phosphors, Luminescent materials, Coatings, Design.) Electron tubes, Photography.

Design details and fabrication problems of a five-gun dual-purpose cathode-ray tube are discussed. Major difficulties were encountered in glass fabrication and tube assembly which resulted from high internal stresses in the bulb. Techniques to overcome these difficulties included heat treatment to dead anneal and extreme care during fabrication. The final design provides improved performance over the 7YP- with regard to higher acceleration voltage, greater deflection sensitivity, and higher resolution. The new tube has the ability to operate in the AN/GLA-5 equipment without electrical retrofit. Final tube photographs, drawings, and specifications are included. (Author)

AD-264 324 Div. 8, 6
(TIPSE/RD) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME RECENT STRIP TRANSMISSION LINE MEASUREMENTS, FORMULAE, TECHNIQUES AND COMPONENTS FOR PHASED ARRAY RADAR,
by Donald H. Temme. 19 Sep 61, 29p. incl. illus. table (Rept. no. 41G-0014)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (Phase shifters, Design, Microwave equipment, Diodes, Ferrites.) (Electronic switches, Printed circuits, Diodes.) (*Transmission lines, Microwave equipment, Design, Electrostatic capacitances, Attenuation, Dielectrics, Measurement.) (Copper coatings, Dielectrics.) (Radar equipment, Transmission lines.)

Contents:
Strip Transmission Line Materials Measurements
Dielectric Constant
Attenuation
Power Handling Capability Formulae
Peak Power
Average Power
Strip Transmission Line Techniques
Breadboards
Tellon 3A Fabrication Properties
RF Diode Switches
Microwave Switching Characteristics of Diode Junctions
Experimental Diode Switches
Receiver Selector Switch
Microwave Phase Shifters and Time Delays
General Considerations
Current Investigations
An Experimental Phase Shifting Test

AD-264 344 Div. 8, 26
(TIPSE/DLW) OTS price $1.10

Motorola, Inc., Phoenix, Ariz.
MINIATURE THIN-FILM INDUCTORS.
Interim development rept. no. 1, 1 June-1 Sep 61,
22 Sep 61, 7p. incl. illus. (Rept. no. WP-2631-3)
(Contract NObsr-85397)
Unclassified report

DESCRIPTORS: (*Coils, *Radiofrequency coils, *Miniature electronic equipment, Ferromagnetic materials, Ferrites, Thin films, Helixes, *Manufacturing methods, Production, Design. (Coils, Inductance, Measurement.) (Copper coatings, Electroplating, Surface properties, Processing.)

Research is concerned with the development of a method for fabricating miniature inductors employing thin-film spiral configurations on ferrite substrates. The inductance range to be attained is from 38 microhenry to 1 mh with a minimum Q-value of 100 at a frequency of 1 mc per second. Effort was concentrated on two main tasks: (1) the review and possible selection of the best available ferrite substrate, and (2)

the study of techniques for the formation of the desired inductor spiral pattern upon ferrite materials selected. A number of these inductors were fabricated, and measurements of the inductance achieved and its relation to similar air core inductances were calculated. Reasons for the limited inductance increase and methods for overcoming the limitations are discussed. (Author)

AD-264 347 Div. 8, 30
(TIPSE/DLW) OTS price $7.60

Electron Tube Research Lab., U. of Minn., Minneapolis.
NOISE MEASUREMENTS AS A TOOL IN ELECTRON DEVICE RESEARCH.
Quarterly progress rept. no. 6, 1 Apr-30 June 61, by A. van der Ziel. 30 June 61, 76p. incl. illus. tables.
(Contract DA 36-039-sc-85289)
Unclassified report

DESCRIPTORS: (*Electron tubes, *Cathodes (Electron tubes), *Noise (Radio), Electrostatic capacitance, Admittance, Resistance, Field emission, Fourier analysis, Measurement, Test methods, Test equipment.) (*Parametric amplifiers, Low frequency, Electronic circuits, Signal-to-noise ratio, Sidebands, Design, Tests.) (*Image tubes, Iconoscopes, Diodes, Triodes, Modulator tubes, Oxide cathodes, Oscillators, Twin diodes, Twin triodes, Tests.) Amplifiers.

The low-frequency parametric amplifier was completed and tested. The performance is compared with the results of a theoretical analysis. The noise performance obtained showed some 1/f noise at low frequencies. Preliminary measurements were begun on the photoelectric noise in the image section of an image orthicon. With a light source consisting of a gas-filled tungsten bulb, the initial spectrum showed a 1/f dependence at low frequencies. This is not attributed to the photoemission process but probably comes from the light source. Measurements of Seebeck noise and thermo-emf of bulk oxide materials were continued. Measurements of the noise of 6J6 decal-coated cathodes showed a large amount of 1/f noise. (Author)

AD-264 348 Div. 8, 30
(TIPSE/DLW) OTS price $1.60

Eleconic Systems Lab., Mass. Inst. of Tech., Cambridge.
MEASUREMENTS OF SHOT NOISE IN TUNNEL DIODES AT LOW FORWARD VOLTAGES,
by Carl N. Berglund. Aug 61, 8p. incl. illus.
(Rept. no. ESL-TM-117)
(Contract AF 33(616)5489)
Unclassified report

DESCRIPTORS: (*Diodes, Germanium, Noise (Radio), Direct current, Voltage, High frequency, Temperature, Measurement, Test methods, Test equipment.) Electron tubes.

An accurate method for experimentally determining the equivalent shunt noise-current generator in tunnel diodes in the low positive-resistance regions is described. Using this method, shot-noise measurements were made on a type 1N2939 tunnel diode in the bias range from zero voltage to the peak point, and athree temperatures (203K, 300K, and 373K). The results are presented and compared with calculated noise values. Excellent agreement obtained suggests that the existing theory of shot-noise in tunnel diodes in the low-bias region is adequate. (Author)

AD-264 354 Div. 8, 25
(TIPSE/DLW) OTS price $7.60

Electronics Research Lab., U. of Calif., Berkeley.
(No title).
Consolidated quarterly progress rept. no. 2 for period ending 15 Aug 61.
15 Aug 61, 70p. incl. illus. table.
(Contracts AF 49(638)1043, AF 18(600)1521, AF 19(604)2270, AF 19(604)5466, AF 33(616)6139, AF 41(657)114, AF 49(638)102, AF 33(616)7553, DA 36-039-sc-84923, DA 36-039-sc-85278, Nonr-22253, and Nonr-22257)
Unclassified report

DESCRIPTORS: *Bibliography, Scientific research, Research program administration, *Electronic equipment, *Electronic circuits, Transistors, Amplifiers, Oscillators, Diodes, Parametric amplifiers, Frequency multipliers, *Microwave equipment, Plasma physics, Electron tubes, Wave transmission, Electromagnetic theory, Electromagnetic waves, Propagation, Antennas, Solid state physics, Masers, Control systems, Data processing systems, Microwave amplifiers, Transistor amplifiers.

AD-264 366 Div. 8, 25, 26
(TIPSE/DLW) OTS price $8.60

Motorola, Inc., Phoenix, Ariz.
COMPATIBLE TECHNIQUES FOR INTEGRATED CIRCUITRY,
Quarterly rept. no. 1, 4 May-4 Aug 61.
1 Sep 61, 94p. incl. illus.
(Contract AF 33(616)8276)
Unclassified report

DESCRIPTORS: (*Electronic circuits, *Thin films, Semiconductors, Processing, Design.) (Silicon, Gallium compounds, Arsenides, Intermetallic compounds, Germanium, Crystals, Growth.) (Glass, Films, Tantalum capacitors, Oxides, Tantalum compounds, Tin compounds, Tin coatings, Resistors, Ceramic materials, Dielectrics, Circuits, Manufacturing methods) Amplifiers, Electronic equipment.

Research is concerned with the development of compatible techniques for integrated circuitry. Efforts were made in the development of process techniques which are necessary for integrated circuit fabrication. Results are presented both in morphological areas and thin films as applied to semiconducting substrate. Further efforts in perfecting expitaxial growth techniques are reported. A program was started to develop and fabricate typical circuits which are practical for a wide range of high and low frequency amplifier applications. Investigations are also reported in the development of logic circuitry. (Author)

AD-264 382 Div. 8
(TIPSE/CRJ) OTS price $1.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
ATTENUATION OF VLF RADIO WAVES IN THE ARCTIC OCEAN. SP LINE ITEM 16405,
by M. K. Gagnon. 20 July 61, 14p. incl. illus. tables (USL rept. no. 521)
Unclassified report

DESCRIPTORS: (Radio waves, Radio transmission, Very low frequency, Arctic regions, Ice, Sea water, Measurement.) (Radio waves, Attenuation, Measurement.) (Sea water, Arctic regions, Temperature, Salinity, Electrical conductance, Determination.) Radio receivers, Loop antennas.

Values of VLF field strength in the Arctic Ocean obtained experimentally with an AN/URM-6B receiver and a loop antenna are compared with values computed from temperature and salinity data. The comparison indicates that temperature and salinity data provide sufficient information for the calculation of conductivity in sea water and therefore for the calculation of the attenuation of radio waves in sea water. The experimental data indicate no attenuation of the radio wave in passing through the ice cover. (Author)

AD-264 397 Div. 8, 15
(TIPSP/WH) OTS price $2.60

New York U. Coll. of Engineering, N. Y.
INTERPRETATIONS OF RICCATI EQUATIONS FOR SOME CIRCUITS.
Scientific rept. no. 2,
by D. J. R. Stock and L. J. Kaplan. 26 May 61, 20p. (Technical rept. no. 400-38)
(Contract AF 19(604)7486)
(AFCRL 545) Unclassified report

DESCRIPTORS: *Electrical networks, *Circuits, Transmission lines, Mathematical analysis, Differential equations, Matrix algebra, Microwave networks.

Work on the Riccati equation and its relevance to circuit theory is summarized. The scalar Riccati equation can be associated with the microwave two-port, while a matrix Riccati equation is connected with the 2n-port. (Author)

AD-264 400 Div. 8, 25
(TIPSE/DLW) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ON THE ORIGIN OF VERY-LOW-FREQUENCY EMISSIONS,
by H. Unz. 15 Aug 61, 13p. (Rept. no 1116-9; Scientific rept. no. 5)
(Contract AF 19(604)7270)
(AFCRL-750) Unclassified report

DESCRIPTORS: (*Magnetohydrodynamics, Plasma physics, Terrestrial magnetism, *Electromagnetic waves, Very low frequency, Electrons, Velocity, Ionosphere, Magnetic fields, Propagation, *Ionospheric propagation, Theory, Mathematical analysis.) (Electron beams, *Traveling wave tubes, Amplifiers, Test methods.)

The magneto-ionic theory for drifting plasma is applied to the theory on the origin of very-low-frequency emissions. The frequency at which there will be interaction, and possible amplification, between two different streams of electrons is found. It is shown that physical phenomena are explained by interaction between several streams of electrons of different plasma frequency and different velocity. (Author)

AD-264 414 Div. 8, 26
(TIPSE/CCD) OTS price $3.60

Litton Industries, San Carlos, Calif.
COAXIAL GAS DISCHARGE DEVICE.
Final rept. 19 May 60-30 Sep 61.
30 Sep 61, 36p. incl. illus. tables.
(Contract DA 36-039-sc-85128; Continuation of Contract DA 36-039-sc-72403)
Unclassified report

DESCRIPTORS: *Radar duplexers, Transmit-receive tubes, Anti-transmit-receive tubes, Electron tubes, *Discharge tubes, Gas discharges, Packaged circuits, Tests, Design, Broadband.

The specifications of the original and the refined model of the duplexer are compared. The pertinent changes made in the refinement are discussed. Typical operating data are presented. The results of environmental and life tests are described. A considerable reduction in the size and weight of the duplexer has been accomplished with an improvement in ruggedness and reliability. The field replaceability of the tubes has been enhanced. The electrical specifications of the duplexer are given. (Author)

AD-264 416 Div. 8
(TIPSE/DLW) OTS price $13.00

Microwave Lab., Stanford U., Calif.
DEVELOPMENT OF HIGH-POWER BROADBAND TUBES AND RELATED STUDIES.
Annual rept. nos. 1-2, July 58-June 60.
Jan 61, 171p. incl. illus. tables (ML rept. no. 773)
(Contract AF 30(602)1844, Proj. 4506)
(RADC TN 61-43) Unclassified report

DESCRIPTORS: (*Traveling wave tubes, Electronic circuits, Coupling circuits, Cathodes (Electron tubes, *Klystrons, Electron guns, S band, L band, Broadband, Test equipment, Microwave amplifiers, Microwave oscillators, Design, Tests.) Electron tubes, Amplifiers, Oscillators.

A cloverleaf S-band TWT structure was designed to achieve the objectives of 10 Mw peak power and 30 kw average power with efficiencies as high as possible. A method was determined for suppressing oscillations in high-power TWT amplifiers which occur on the rise and fall of voltage pulse. An external circuit TWT was designed to obtain a structure in which changes on the circuit could be made relatively easily and cheaply. Performance characteristics of a centipede high-power TWT are presented. The design of components for the 10 Mw cloverleaf TWT is described and a brief review of the circuit design is presented. A detailed discussion of the component design necessary for use with the tapered TWT is presented. An electron stick was studied as a tool for evaluating high-power TWT circuits or klystron circuits without the construction of a complete tube. A hollow beam electron gun with high perveance and convergence was produced. A theoretical study was completed on tapered structures.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-264 455 Div. 8
(TIPSE/CCD) OTS price $1.10

Stanford Electronics Labs., Stanford U., Calif.
DIRECT OBSERVATION OF MICROWAVE-FREQUENCY BEATS DUE TO PHOTOMIXING OF RUBY-OPTICAL-MASER MODES,
by B. J. McMurtry and A. E. Siegman. 25 Aug 61, 5p. incl. illus. (Technical rept. no. 177-1)
(Contracts DA 36-039-sc-85387 and AF 49(638)660)
(AFOSR-1350) Unclassified report

DESCRIPTORS: (*Microwaves, Optical equipment, *Ruby, *Masers, Traveling wave tubes, Oxide cathodes, Measurement.) (Radio receivers, *Phototubes, Microwaves, Design.)

Observations were made of microwave signals produced by photomixing of near-neighbor axial-mode components in the output spectrum of a ruby optical maser (laser). The observations were made by focusing the laser output onto the oxide cathode of an operating 2500-4000 Mc traveling-wave tube. Mixing (heterodyning) between the simultaneous, discrete optical frequencies in the laser output occurs in the TWT cathode, producing microwave amplitude modulation of the beam current. This amplitude modulation is amplified in the helix section, producing easily observable microwave signals in the TWT output. Within the TWT bandwidth, discrete signals were observed at 1800 plus or minus 20, 2410 plus or minus 3, 3000 plus or minus 20, and 3600 plus or minus 20 Mc, representing the 'photo-beats' between third- through sixth-nearest neighbors in the laser-mode spectrum. This method of observation is a powerful tool for study of optical masers, and also has significant implications for communications employing microwave-modulated light. It verifies a number of suggestions for constructing microwave phototubes outlined by the authors at a recent conference. (Phys. Rev. 99:1691, 1955) (Author)

AD-264 460 Div. 8
(TIPSE/CRJ) OTS price $21.00

Stanford Research Inst., Menlo Park, Calif.
BACKSCATTER LITERATURE SURVEY,
by George H. Hagn, Donald L. Nielson and Frances H. Smith. June 61, 376p.
(Contract SD-66)
Unclassified report

DESCRIPTORS: *Terrain, *Ionosphere, Aerodynamic configurations, *Ionospheric propagation, *Radio waves, *Radio signals, Electromagnetic waves, *Radar reflections, Scattering, *Bibliography, High frequency, Propagation.

A survey of the literature pertaining to backscatter is presented in bibliographical form. Authors' abstracts have been included whenever they were available and appeared adequate. The survey is intended to cover the period from the inception of the study of ionospheric backscatter (about 1928) through 1960. This survey deals mainly with ionospherically propagated backscatter at HF. Some work on terrain return and on direct backscatter from discrete objects is presented, and the major early papers on incoherent (exospheric) scatter from electrons have been included. Material dealing with troposcatter, ionoscatter, forward propagation at HF, and meteoric and auroral echoes has, in general, been excluded. (Author)

AD-264 496 Div. 8
(TIPSE/CCD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE ELECTRON AND IONIC EMISSION OF METAL-FILM CATHODES IN CESIUM VAPOR,
by N. D. Morgulis and Yu. P. Korchevoy.
29 Aug 61, 9p. incl. illus. (Trans. no. MCL-1354 of Izvestiya Vysshikh Uchevnykh Zavedeniy, Fizika 5:137-142, 1960)
Unclassified report

DESCRIPTORS: (Cathodes, Cathodes (Electron tubes, Thermionic emission, Metal films, Thin films, Alkali metals.) (Thermionic emission, Electrons, Ions, Ionization, Adsorption.) (Cesium, Vapors, Barium alloys, Nickel alloys, Tungsten alloys, Gas discharges.) (Translations, USSR, Technological intelligence, Cathodes.)

Some properties of electron and ion emission of porous Ba-W and pressed Ba-Ni metal-film cathodes in cesium vapor are examined here. The experimental data obtained show: (1) the essential and typical adsorption effect caused by Cs vapor on the increased electron emission of those cathodes which already have active Ba film on their surfaces; and (2) the presence in these cases of significant thermal ionization of the atoms of cesium vapors on the relatively depopulated microscopic regions of the surface of these cathodes, the ion current of which can serve as the characteristic of the degree surface inhomogeneity. (Author)

AD-264 527 Div. 8, 5
(TIPSE/DLW) OTS price $2.60

Wisconsin U., Madison.
SURFACE WAVE, ANTENNA AND MICROWAVE FILTER ENGINEERING RESEARCH STUDY.
Quarterly progress rept. no. 7, 1 Mar-31 May 61, by Elmer H. Scheibe. 30 June 61, 14p. incl. illus.
(Contract DA 36-039-sc-78326)
Unclassified report

DESCRIPTORS: (*Waveguides, *Cavity resonators, Electronic circuits, Microwave equipment, Communication equipment, *Radiofrequency filters, Design.) (*Electromagnetic waves, Wave transmission, Electromagnetic wave reflections, Diffraction, Propagation, Measurement, Test methods, Test equipment, Automatic.) (Antennas, Electromagnetic theory.)

An automatic measuring scheme was developed to speed up the measurements on beam waveguide resonators in order to circumvent the problem of frequency drift. The measuring system also resulted in increased accuracy of amplitude and frequency data. A computer solution for the diffraction loss of the higher modes in a beam waveguide was investigated. One of the higher modes was observed experimentally in a beam waveguide resonator. (Author)

AD-264 528 Div. 8
(TIPSE/CRJ) OTS price $2.60

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF AN E-BAND AMPLIFIER.
Quarterly rept. no. 2.
9 Aug 1, 17p. incl. illus. (Technical note no. 2)
(Contract AF 30(602)2422, Proj. 5573)
(RADC TN 61-193) Unclassified report

DESCRIPTORS: (*Microwave amplifiers, Extremely high frequency, Yttrium compounds, Iron compounds, Garnet, Crystals, *Traveling wave tubes, Radiofrequency filters, Tuning devices, *Band pass filters, Magnets, Electromagnets, Focusing, Helixes, Waveguide filters, Ferromagnetic materials, Design.) (Amplifiers, Noise (Radio), Reduction.) Electron tubes.

Progress is reported on the tunable filter and the design of the tube's permanent magnet. An electromagnet for testing the tube and filter was built and tested. Wide gap fields to 2.5 times the design estimate with 4% uniformity over the gap are available for tube focusing. In the short gap mode of operation this electromagnet provides over 30,000 gauss, sufficient for operation of the millimeter wave filter. A test structure for the YIG crystals was fabricated. This structure should allow separate testing of the crystal itself for Q to determine the expected optimum performance of the filter with the material on hand. Comparison with actual filter performance will thus allow separation of the effect of miscellaneous waveguide losses and reflections. (Author)

AD-264 558 Div. 8
(TIPSE/DLW) OTS price $14.50

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ANALYSIS AND DESIGN OF THE LOG-PERIODIC DIPOLE ANTENNA,
by Robert L. Carrel. 1961, 197p. incl. illus. tables, 41 refs. (Technical rept. no. 52)
(Contract AF 33(616)6079, Proj. 9-(13-6278))
Unclassified report

DESCRIPTORS: (*Dipole antennas, Broadband, Mathematical analysis, Design, Electromagnetic theory.) (Antennas, Antenna radiation patterns, Admittance, Impedance, Phase measurement, Matrix algebra, Functions, Measurement.)

A mathematical analysis of the logarithmically periodic dipole class of frequency independent antennas, which takes into account the mutual coupling between dipole elements, is described. The input impedance, directivity, and bandwidth, as well as the input current and voltage of the several elements, are calculated. A new concept, the bandwidth of the active region, is formulated and is used to relate the size and operating bandwidth of the antenna. The limiting values of the various parameters that describe the antenna are explored. The results from the mathematical model are shown to be in good agreement with measurements. A step by step procedure is presented which enables one to design a log-periodic dipole antenna over a wide range of input impedance, bandwidth, directivity, and antenna size. (Author)

AD-264 604 Div. 8
(TIPSE/CRJ) OTS price $5.60

Rand Corp., Santa Monica, Calif.
CLASSICAL ELECTRON THEORY FROM A MODERN STANDPOINT,
by Sidney Coleman. Sep 61, 46p. incl. illus. 15 refs. (Rept. no. RM-2820-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: (*Electrons, *Electron charge, Motion, *Electromagnetic fields.) (Integral transforms, Green's function, Partial differential equations, Theory.) *Electromagnetic theory, Quantum mechanics.

The classical theory of a charged point particle interacting with the electromagnetic field is developed from first principles. The formalism is constructed so as to reveal the underlying physics and to stress the similarity between the classical theory and the corresponding quantum theory. A number of traditionally troublesome points are discussed, including the electromagnetic self-energy, the relativistic radiation-reaction equation, the occurrence and removal of runaway modes, the radiation from a uniformly accelerated charge, and the relation between Maxwell's electrodynamics and the action-at-a-distance theory of Wheeler and Feynman. (Author)

AD-264 649 Div. 8
(TIPSE/DLW) OTS price $5.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A NEW CLASS OF TUNABLE RC NULL NETWORKS,
by Donald A. Calahan. Aug 61, 63p. incl. illus.
(BRL rept. no. 1138)
(Army Proj. no. 503-06-011)
Unclassified report

DESCRIPTORS: (*Electrical networks, *Electronic circuits, Synthesis, Theory.) (*Tuning circuits, Tuning devices, Resistors, Capacitors, Phase shifters, Mathematical analysis.) (Tuned circuits, Tuned amplifiers, Radiofrequency filters, Servo systems, Design, Circuits.)

The problem of synthesis of a singly-tunable grounded RC null network is considered. An approximation and realization scheme is developed which allows (in theory) an arbitrarily deep null to be varied over an arbitrarily large frequency range by means of a single resistor. Experimental results from several typical networks are presented and discussed. Typical applications of the network are also given. (Author)

AD-264 679 Div. 8
(TIPSE/VB) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
NONLINEAR DISTORTION IN FEEDBACK AMPLIFIERS,
by C. A. Desoer. 14 June 61, 16p. incl. illus. 10 refs. (Series no. 60, Issue no. 374)
(Navy Dept. Grant no. 15965)
Unclassified report

DESCRIPTORS: (*Feedback amplifiers, Distortion.) (Distortion of Nonlinear systems, Mathematical analysis, Functional analysis.)

Consider a feedback amplifier F with a nonlinear output device T sub o and an open loop amplifier A having the same gain and the same output device T sub o. If the gain of the forward amplifier Mu and feedback network Beta are independent of frequency, it is well known that under the usual conditions, the nonlinear distortion Zeta of F due to T sub o is related to the nonlinear distortion Zeta of A by Zeta = Zeta/(1+Mu Beta). In this paper we determine conditions under which a similar formula, namely Zeta = (1+Mu Beta) times Zeta, applies when Mu and Beta are strictly stable linear time invariant amplifiers. The interpretation of the formula is the following: Zeta is the function of time which is output of an amplifier whose gain is 1/(1+Mu Beta) when Zeta is its input, and Zeta is the nonlinear distortion of the open loop amplifier A. (Author)

Division 9 - FLUID MECHANICS

AD-264 690 Div. 8
(TIPSE/DLW) OTS price $5.60

Boeing Co., Renton, Wash.
A TEETER-TOTTER APPROACH TO ARRAY SCANNING,
by John C. Fan and Luis L. Oh. Aug 61, 49p. incl. illus. tables, 19 refs. (Scientific rept. no. 2)
(Contract AF 19(604)6189)
(AFCRL-558) Unclassified report

DESCRIPTORS: (*Dipole antennas, Microwave equipment, *Electronic scanners, Phase measurement, *Phase shifters, Helixes, *Delay lines, Transmission lines, Antenna couplers, *Waveguides, Design.) (Antennas, Illumination, Standing wave ratios, Antenna radiation patterns, Lobing, Impedance, Measurement.)

A new compact, electromechanical scanning array in which a small mechanical angular motion of a scanning lever arm can cause a wide degree of beam steering is demonstrated. The teeter-totter scanning array uses a ganged arrangement of helical delay lines as phase shifters and directional couplers as power dividers. Any desired antenna illumination can be obtained by simply varying the coupling of each directional coupler. Radiation patterns at scanning angles up to 60 degrees off broadside were recorded for a uniform distribution, a -20 db and a -30 db Tschebyscheff antenna distribution. (Author)

AD-264 693 Div. 8, 25
(TIPSE/DLW) OTS price $1.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR - REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 24 Aug 61, 7p. incl. tables.
(Scientific rept. no. 13)
(Contract AF 19(604)4093)
(AFCRL-771) Unclassified report

DESCRIPTORS: (*Cathodes (Electron tubes), Electron tubes, *Thermionic emission, Work functions, Temperature, Evaporation, Electrical properties, Surface properties, Measurement.) (Refractory materials, Thin films, Semiconductors, Coatings, Barium, Barium compounds, Oxides, Tests.)

Thermionic emission constants and evaporation rate data are presented for several dispenser cathode systems. Initial interpretation of experimental data suggests the emission originates from a thin layer on the substrate surface that is a donor type semiconductor. (Author)

9. FLUID MECHANICS

AD-263 966 Div. 9, 25
(TIPSP/WH) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE COMPLETE EXPRESSIONS FOR ADDED MASS OF A RIGID BODY MOVING IN AN IDEAL FLUID.
Research and development rept.,
by Frederick H. Imlay. July 61, 22p. incl. illus. 20 refs. (Report no. 1528)
Unclassified report

DESCRIPTORS: (*Bodies of revolution, Spheres, Underwater, Equations of Motion, *Hydrodynamics.) (Mathematic analysis, Matrix algebra, Differential equations, *Fluid mechanics.)

Expressions are given for the complete added mass effect for any rigid body moving in any manner in an ideal fluid. The expressions give the force and moment acting on the body in terms of 21 added mass derivatives. These derivatives are the maximum number that are independent for a Cartesian set of body axes. Reduced expressions are also given for a finned prolate spheroid with the origin of the body axes located at some point on the axis of revolution. Theoretical values of the added mass derivatives are given for an ellipsoid and a prolate spheroid when the reference axes are principal axes for an origin located at the center of the ellipsoid or spheroid. The added mass effect for a stationary body in an accelerating fluid is also described. (Author)

AD-263 998 Div. 9, 14
(TIPSM/SEB) OTS price $3.60

General Dynamics/Fort Worth, Tex.
THE DEVELOPMENT OF A SYSTEM FOR CONTINUOUS MEASUREMENT OF VISCOSITY IN A NUCLEAR RADIATION FIELD,
by E. T. Smith. 11 Sep 61, 37p. incl. illus. tables (Document no. NARF-61-32T; FZK-9-156)
(Contract AF 33(600)38946)
Unclassified report

DESCRIPTORS: (*Fluids, Radiation effects, Viscosity, Measurement, Test methods, Test equipment, Laboratory equipment, *Viscosimeters, Design, Tests.) (*Liquids, Lubricants, Fuels, Silicones, Coolants, Hydraulic fluids.)

A method for the continuous monitoring and recording of the viscosity of a fluid while it is being irradiated was developed. This method utilizes a commercially produced viscometer that operates on the vibrating-reed principle and involves the adaptation of this instrument and its associated apparatus for use with a nuclear reactor test system. Continuous curves of viscosity versus time were recorded during two irradiation experiments. Accuracy of the data was well within the usual limits placed upon continuous viscometers. (Author)

AD-264 002 Div. 9, 15
(TIPSP/WH) OTS price $1.10

Royal Coll. of Science and Technology, Glasgow (Gt. Brit.).
FURTHER STUDIES ON THE HODOGRAPH METHOD IN GAS DYNAMICS.
Final technical rept.,
by D. C. Pack, J. B. Helliwell, and A. G. Mackie. June 61, 5p.
(Contract AF 61(052)407; Continuation of Contract AF 61(514)1170; In cooperation with St. Andrews U. (Gt. Brit.))
(AFOSR-917) Unclassified report

DESCRIPTORS: (*Gas flow, Fluid mechanics, *Subsonic flow, *Numerical methods and procedures.) (Aerodynamic configurations, Wedges, Conical bodies, Wind tunnels.) (Mathematical analysis, Partial differential equations.) Jets.

The flow of a free stream past a wedge profile at incidence has been examined for the Roshko and Weinstein-Cole models, with the stagnation point forced to be at the tip of the wedge. The free stream singularity consisted of a dipole and a simple pole. The solution of the boundary value problem for a wedge placed centrally in a channel was formulated in terms of dual integral equations. Lift coefficients and the dimensions of the profile have been computed as functions of the transonic similarity parameter. The generalized hodograph equation has been solved to determine the Kirchhoff-Helmholtz flow past a wedge with free stream Mach number between zero and unity. The variation of drag coefficient with Mach number has been studied and asymptotic forms found for the free streamlines downstream. The stream function has also been found for the flow of a general gas past a flat plate held at an angle of incidence in a sonic stream, and the drag coefficient expressed in analytical form. (Author)

AD-264 028 Div. 9, 25
(TIPSP/WH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
FREE-FLIGHT INVESTIGATION OF HEAT TRANSFER TO AN UNSWEPT CYLINDER SUBJECTED TO AN INCIDENT SHOCK AND FLOW INTERFERENCE FROM AN UPSTREAM BODY AT MACH NUMBERS UP TO 5.50,
by Howard S. Carter and Robert E. Carr. Oct 61, 34p. incl. illus. (Technical note D-988)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-988.

DESCRIPTORS: (*Aerodynamic heating, *Heat transfer, Aerodynamic configurations, Blunt bodies, Cylindrical bodies.) (Aerodynamics, Fluid mechanics, Guided missiles, Spaceships.) (Aerodynamic heating, *Supersonic flow, *Hypersonic flow.)

Heat-transfer rates were measured in free flight along the stagnation line of an unswept cylinder mounted transversely on an axial cylinder so that the shock wave from the hemispherical nose of the axial cylinder intersected the bow shock of the unswept transverse cylinder. Data were obtained at Mach numbers from 2.53 to 5.50 and at Reynolds numbers based on the transverse cylinder diameter from 1.00 x 10 to the sixth power to 1.87 x 10 to the sixth power. Shadowgraph pictures made in a wind tunnel showed that the flow field was influenced by boundary-layer separation on the axial cylinder and by end effects on the transverse cylinder as well as by the intersecting shocks. Under these conditions, the measured heat-transfer rates had inconsistent variations both in magnitude and distribution which precluded separating the effects of these disturbances. The general magnitude of the measured heating rates at Mach numbers up to 3 was from 0.1 to 0.5 of the theoretical laminar heating rates along the stagnation line for an infinite unswept cylinder in undisturbed flow. (Author)

AD-264 140 Div. 9, 1, 12
(TIPSE/CDM) OTS price $9.00

Office of Naval Research, Washington, D. C.
SYMPOSIUM PROCEEDINGS STRUCTURAL DYNAMICS OF HIGH SPEED FLIGHT LOS ANGELES, CALIFORNIA - APRIL 24, 25, 26, 1961.
1961, 746p. incl. illus. tables (Rept. no. ACR-62, vol. 1)
Unclassified report

DESCRIPTORS: (*Symposia, *Structural shells, *Aerodynamics, Elasticity, Hypersonics.) (Supersonic flow, *Flutter, Vibration, Dynamics, Load distribution, *Triangular wings, Airplane panels.) (Tracks (Aerodynamics), Model tests.) (High temperature research, Aerodynamic heating, Wings, Airfoils.) (Liquid rocket propellants, Propellant tanks.) (Inertial guidance, Control systems, *Guided missiles, *Airplanes, Satellite vehicles, Spaceships, Aircraft, Structural shells, Fatigue (Mechanics), *Noise, Rocket motor noise.) (Wind tunnel models, Tests.)

Contents: Concepts for aeroelastic system approximations; static aerodynamics for flutter analyses; flutter at high mach numbers; an indicial flutter analysis for hypersonic delta wings; a theory for aeroelastic studies of delta lifting surfaces; flutter of flat panels in a low supersonic flow; flutter of rectangular panels; model flight testing on high-speed tracks; liquid behavior in rocket propellant tanks; dynamics of LP vehicles; aero-inertial control system; dynamic loads of missile configurations; wind loads on a vertically rising vehicle; random gust and taxi response calculations for delta wing aircraft; blast-loading on airfoils; stall buffeting loads; a method for analyzing heated wings; deformational response of heated wing structures; thermal stiffness; acoustic fatigue tests for elevated temperatures structural design; structural vibration in space vehicles; structural response to noise inputs; captive missile response to random pressures; structural response to the noise input of the Saturn engines; the environmental vibration problem.

AD-264 149 Div. 9, 15
(TIPSP/WH) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
HORIZONTAL HYDRODYNAMIC IMPACT OF A SPHERE IN THE PRESENCE OF A FREE LIQUID SURFACE,
by E. L. Blokh, tr. by Z. Jakubski, Jan 61, 27p. incl. illus. (Rept. no. STL-TR 61-5110-4, Trans. from Prikladnaya Matematika i Mekhanika, Tom 17, 1953)
Unclassified report

DESCRIPTORS: *Spheres, *Hydrodynamics, Impact shock, *Fluid mechanics, Mathematical analysis, Partial differential equations, Polynomials, Series, Translations, USSR, Technological intelligence.

The problem of motion of a solid body floating on the surface of an incompressible liquid or on the surface of a liquid partly filling a shell is considered as a problem of hydrodynamic impact of a solid body against an incompressible liquid in those cases, in which this motion undergoes very high accelerations within a sufficiently short period of time. The investigation of horizontal impact is much more complicated than that of a vertical impact because the latter comes to the problem of a smooth flowing

around a body entirely enveloped by a liquid. The simplest case of a three-dimensional horizontal impact, i.e., when the solid body is a sphere half immersed in a noncompressible liquid or a spherical shell half-filled with liquid is investigated. (Author)

AD-264 152 Div. 9, 15
(TIPSP/WH) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
HORIZONTAL IMPACT ON AN ELLIPSOID OF REVOLUTION ON AN IDEAL LIQUID HAVING A FREE SURFACE,
by E. L. Blokh, tr. by Z. Jakubski. Jan 61, 39p. incl. illus. (Rept. no. STL-TR 61-5110-5, Trans. from Prikladnaya Matematika i Mekhanika, Tom. 17, no. 6, 1953)
Unclassified report

DESCRIPTORS: (*Bodies of revolution, Ellipsoids, *Hydrodynamics, *Fluid mechanics, Applied mathematics.) (Mathematical analysis, Partial differential equations, Polynomials, Series.) (Translations, USSR, Technological intelligence.)

This analysis is an immediate continuation of a paper (AD-264 149) in which the horizontal hydrodynamic impact of a sphere was examined. The impact represented the simplest case of the three-dimensional problem of a horizontal impact on a solid body in an ideal liquid having a free surface. As the investigation of all these cases is conducted by a general and sufficiently uniform method, this analysis presents a detailed solution of the outer problem of an oblate ellipsoid of revolution only; for all other cases, however, only the final results are given together with the minimum of necessary explanations. (Author)

AD-264 226 Div. 9, 1
(TIPSE/WAW) OTS price $8.10

Hiller Aircraft Corp., Palo Alto, Calif.
VTOL DOWNWASH IMPINGEMENT STUDY.
Summary rept.,
by A. Morse and H. Newhouse. Aug 61, 75p. incl. illus. (Engineering rept. no. 61-3)
(Contract DA 44-177-tc-655)
(TREC Technical rept. no. 61-37)
Unclassified report

DESCRIPTORS: (*Shrouded propellers, *Helicopter rotors, *Aerial propellers, *Ground effect, Tests.) (*Jets, Deflection, Ground effect, Tests.) (Vertical take-off planes, Short take-off planes, Helicopters, Flying platforms, Take-off, Airplane landings.) (Soils, Water, Surfaces, Erosion.) *Downwash, Wake.

This program was designed to provide fundamental background information and to aid in the evaluation of operational problems associated with the slipstream impingement. Configurations used consisted of: open propellers, ducted propellers, side by side jets, and ground effect machines of the plenum and annular nozzle type. Disk loadings of 2 to 150 pounds per square foot and Z/D ratios of .25 to 3 were investigated. Data were obtained to determine: the over-all flow pattern, flow velocities, erosion rates for various soils, and the surface deflection and spray height caused by operation over water. The maximum field dynamic pressure resulting from the impingement was determined to be a function of Z/D and disk loading and was found to be the parameter governing the erosion onset and the maximum surface deflection for operation over water. Dry loose material such as sand, dust, dry grass, etc. erodes when the surface dynamic pressure is three pounds per square foot, or less. Water spray starts to form in the same range of surface dynamic pressure. Many natural surfaces will withstand surface dynamic pressures above 150 pounds per square foot with very minor damage. (Author)

AD-264 278 Div. 9
(TIPSP/WH) OTS price $9.60

Institute of Engineering Research, U. of Calif. Berkeley.
SOME MEASUREMENTS OF LONGITUDINAL SPACE-TIME CORRELATIONS OF WALL PRESSURE FLUCTUATIONS IN TURBULENT PIPE FLOW,
by William Anton VonWinkle. Sep 61, 111p. incl. illus. (Series no. 82, Issue 20)
(Contract Nonr-22230)
Unclassified report

DESCRIPTORS: (Pipes, *Turbulent flow, *Turbulent boundary layer, Pressure, Measurement.) (*Fluid flow, Experimental data, Fluid mechanics, Statistical analysis, *Acoustics, Noise.)

Measurements made on some of the characteristics of the turbulent pressure field at the wall of a cylindrical pipe yielded root-mean-square pressure levels, power spectra, longitudinal space-time correlations, and convection velocity over a limited range of Reynolds number. The root-mean-square pressure levels were proportional to the dynamic pressure and when nondimensionalized by use of the dynamic pressure were observed to be independent of the Reynolds number and approximately equal to 0.008 over the Reynolds number range examined. The measurements indicate the existence of an apparent downstream convection of the pressure field at a rate which is approximately the mean discharge velocity of the pipe flow. The pressure field in addition to being convected was also dispersed. Estimates of the scale of the turbulence were obtained. A limited statistical analysis of the pressure time history indicates that the amplitude variation is Gaussian. (Author)

AD-264 295 Div. 9, 25
(TIPSE/NTM) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
GENERAL CRYOPUMPING STUDY,
by E. S. J. Wang, J. A. Collins, Jr., and J. D. Haygood. Oct 61, 42p. incl. illus. table, 12 refs. (Rept. no. AEDC TN 61-114)
(Contract AF 40(600)800, Proj. 7776)
Unclassified report

Paper presented at the 1961 Cryogenic Engineering Conference, August 15-17, 1961, Ann Arbor, Mich.

DESCRIPTORS: (*Cryogenics, *Space environmental conditions, Simulation, Test equipment.) (Kinetic theory, Gases, Surfaces, Cooling, Nitrogen, Carbon dioxide, Liquefied gases.)

The general techniques of cryogenic pumping and their application to space environmental simula-

tion are discussed. A theoretical analysis based on the kinetic theory of gases is presented which leads to a definition of the capture coefficient and a determination of the relationship between the capture coefficient and the thermal accommodation coefficient. Experimental results are presented for the cryopumping rates of carbon dioxide and water on a surface cooled by liquid nitrogen. The trapping of nitrogen by water and carbon dioxide is also discussed, and some effects of surface configuration on the cryopumping rate are shown. (Author)

AD-264 385 Div. 9
(TIPSP/JDP) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
THE EFFECT OF FLUID INJECTION ON THE DRAG OF FLAT PLATES AT HIGH REYNOLDS NUMBERS,
by Paul S. Granville. Sep 61, 11p. incl. illus.
(Rept. no. 1520)
Unclassified report

DESCRIPTORS: (Sheets, *Drag, Film cooling, Fluids, *Turbulent boundary layer, Reynolds number.)

An analysis of the effects of fluid injection on the drag of flat plates with turbulent boundary layers indicates no reduction in over-all drag even though the local skin friction is less with fluid injection than without. This is accounted for by the drag due to the momentum changes of the injected fluid when taken from the ambient flow. (Author)

AD-264 402 Div. 9, 25
(TIPSB/LH) OTS price $9.10

Oklahoma State U. Research Foundation, Stillwater.
A BIBLIOGRAPHY ON FLOW BIREFRINGENCE.
Interim technical rept. no. 3,
by G. B. Thurston and J. L. Schrag. Sep 61, 103p.
(Office of Ordnance Research, Grant DA-ORD-31-124-61-G10)
(AROD rept. no. 2231:5)
Unclassified report

DESCRIPTORS: (*Bibliography, Scientific reports, *Fluid flow, Turbulence, Turbulent flow, Diffraction, Refraction, Laboratory equipment.) *Polymers, *Molecules, *Colloids, *Solutions.

This bibliography is concerned with the physical apparatus and physical theories applicable to the phenomena of flow birefringence. Attention is also given to references to studies of specific materials. The principal period of the referenced publications is 1940 through 1960. The references are grouped in accordance with a detailed subject outline. The major divisions of the subject outline are: Experimental Methods and Apparatus, Theoretical Development, Books and Review Articles. Abstracts of 212 publications are given. (Author)

AD-264 408 Div. 9
(TIPSP/GW) OTS price $1.60

James Forrestal Research Center, Princeton U., N. J.
RESEARCH ON LAMINAR AND TURBULENT BOUNDARY LAYERS AND TRANSITION AT SUPERSONIC SPEEDS.
Final rept., 14 Nov 52-15 Sep 58.
15 Sep 58, 11p.
(Contract AF 18(600)498)
(AFOSR TR 59-17) Unclassified report

DESCRIPTORS: (Wind tunnel models, Blunt bodies, *Laminar boundary layer, *Turbulent boundary layer, *Supersonic flow, Magnetohydrodynamics.) (Pressure, Theory, Vortices, Nozzles, Shock waves, Heat transfer, Sheets.) (Helium, Phosphors, Temperature, Measurement.)

AD-264 409 Div. 9
(TIPSP/JDP) OTS price $6.60

Polytechnic Inst. of Brooklyn, N. Y.
TRANSONIC ROTATIONAL FLOW OVER A CONVEX CORNER,
by Roberto Vaglio-Laurin. Aug 59, 56p. incl. illus. tables, 12 refs. (PIBAL rept. no. 431)
(Contract AF 49(638)217, Proj. 9781)
(AFOSR TN 59-355) Unclassified report

DESCRIPTORS: (*Transonic flow, Axially symmetric flow, *Vortices, *Blunt bodies, *Convex bodies, Mathematical analysis, Applied mathematics, Taylor's series.)

A singularity is encountered in the flow field about two-dimensional and axisymmetric bodies characterized by a sharp corner, where the fluid velocity becomes sonic. An investigation of this sonic singularity, and the application of results to the analysis of flow fields about blunt bodies are presented. It is shown that the problem belongs to the family of asymptotic or boundary layer phenomena of mathematical physics. The solution of the first approximation equations is given by a series in powers of a variable measuring the distance from the corner with coefficients depending on an appropriate similarity variable. The leading coefficient of the series is independent of three-dimensional and rotationality effects, in complete analogy to the well-known solution of the corner problem in supersonic flow. Results are presented for the leading singularity and for the first two corrections due to rotationality and axial symmetry of the flow. (Author)

AD-264 410 Div. 9, 12
(TIPSP/JDP) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
EXPERIMENTAL PRESSURE, TEMPERATURE, AND STRAIN MEASUREMENTS ON ABLATING HEMISPHERICAL NOSE CONES IN HYPERSONIC FLOW. TEST SERIES II,
by S. V. Nardo, Burton Erickson, and Joseph Kempner. July 61, 58p. incl. illus. tables (PIBAL rept. no. 574)
(Contract Nonr-83923, Proj. NR 064-433)
Unclassified report

DESCRIPTORS: (*Guided missile noses, *Ablation, Pressure, Temperature, Stresses, Measurement, Hypersonic wind tunnels.) (Wind tunnel models, Aluminum alloys, Surface area, Ablation, Guided missile noses.) (Experimental data, Tables, Photographs.)

The results of pressure, temperature and strain measurements on three hemispherical nose cones tested and ablated in a hypersonic tunnel are presented. The shrouded model technique was used in all tests. Wind tunnel stagnation pressure was maintained at a nominal value of 150 psia, and stagnation temperatures varied from 1650 R to 1900 R. The test conditions correspond to Mach numbers in the range of 15 to 20,

at altitudes of from 60,000 to 70,000 ft. All three models were fabricated from cast aluminum alloy 356 T-6, and all models had outside diameters of 7-3/4 inches. Two models were 1-in. thick, and the third had a 1/2-in. thickness. Ablation of the surface material was allowed to occur in all tests. A complete presentation of the data is given in the form of tables, graphs, and photographs. (Author)

AD-264 445 Div. 9, 25
(TIPSP/JD) OTS price $6.60

Space Technology Labs., Inc., Los Angeles, Calif.
A GENERALIZED FINITE-DIFFERENCE SOLUTION OF AXISYMMETRIC ELASTIC STRESS STATES IN THIN SHELLS OF REVOLUTION,
by Ralph E. Hubka. 1 June 61, 59p. incl. illus. tables (Rept. no. 7106-0066-NU-000; EM-11-19)
(Contract AF 04(647)619)
(AFBMD TN 61-43) Unclassified report

DESCRIPTORS: (*Elastic shells, *Structural shells, *Load distribution, Thermal stresses, Deflection.) (Mathematical analysis, Difference equations, Simultaneous equations, Matrix algebra, Numerical methods and procedures, Digital computers, Programming.)

A generalized finite-difference method for the determination of axisymmetric elastic stress states in thin shells of revolution is presented. Orthotropy, arbitrarily varying thickness and loading along the meridian, temperature variation both along the meridian and through the thickness, variation of material properties with respect to temperature, and linearized large deflection effects are considered. For isotropic shells of uniform temperature, the governing equations of equilibrium and compatibility, with the large deflection effects neglected, reduce to the finite-difference equivalent of the Reissner-Meissner equations. Solution of the difference equations is obtained with the Gaussian elimination method by specializing the technique of application to the band matrix of the problem. Numerical results are compared with those given by other methods, and the procedure used in obtaining a small-deflection solution to a missile pressure chamber problem is outlined. (Author)

AD-264 469 Div. 9
(TIPSP/TL) OTS price $8.10

Stanford U., Calif.
ON THE STABILITY OF LIQUID LAYERS SPREAD OVER SIMPLE CURVED BODIES,
by Richard M. Beam and Max Anliker. June 61, 73p. incl. illus. tables (Technical rept. no. 3; SUDAER no. 104)
(Contract Nonr-22530, Proj. NR 064-425)
Unclassified report

DESCRIPTORS: (Boundary layer, *Stability of *Liquids on Surfaces and *Curved profiles.) (Countermeasures to Aerodynamic heating by Ablation with Evaporation of Liquid metals on Re-entry vehicles.) (Oscillation of Fluid flow in Spaceships and Propellant tanks of Guided missiles.)

The stability of liquid layers spread over simple curved bodies is investigated theoretically. It is assumed that the fluid is incompressible and inviscid and the flow irrotational. The effects of surface tension and uni-directional body forces are included. As the differential equation governing the equilibrium of liquid layers in the presence of surface tension is highly nonlinear, the problem of stability is studied by means of an inverse method. That is, the shape of the liquid layer is prescribed and the criterion for its stability established. The equations of motion for small perturbations about the equilibrium configuration and the boundary conditions are developed for the general two-dimensional case, the three-dimensional case with axial symmetry, and the special case of a layer of uniform thickness spread over a rigid sphere. (Author)

AD-264 479 Div. 9, 27
(TIPSP/TL) OTS price $2.60

United Technology Corp., Sunnyvale, Calif.
DYNAMICS OF TWO-PHASE FLOW IN ROCKET NOZZLES.
Quarterly technical progress rept. no. 1, 1 May-31 July 61,
by J. J. Allport and B. G. Wrenn. 30 Aug 61, 20p. incl. illus.
(Contract NOw 61-0760-c)
Unclassified report

DESCRIPTORS: (*Nozzles, *Rocket motor nozzles, Design, Pressure, Temperature.) (*Fluid flow, *Gas flow, Aerodynamics.) (Theory, Particles, Particle trajectories, Density.) (Penetration, Surfaces, Velocity, Specific heat, Instrumentation.) (Programming, Computers.) (Mathematical prediction.) (Test facilities.) (Direct current, Amplifiers, Galvanometers, Photographic equipment, Detectors.)

Theoretical and experimental investigation is conducted on the radial and axial velocity lag of a solid disperse phase in accelerating gases. The objective is to obtain basic data regarding the nozzle flow dynamics of a gas-particle mixture which results from the combustion of solid propellants containing metal additives. (Author)

AD-264 494 Div. 9, 25
(TIPSP/GRW) OTS price $8.10

Stanford U., Calif.
A THEORY OF ENTROPY LAYERS AND NOSE BLUNTNESS IN HYPERSONIC FLOW,
by James K. Yakura. July 61, 77p. incl. illus.
(Rept. no. SUDAER 110)
(Contract AF 49(638)965)
(AFOSR-1271) Unclassified report

DESCRIPTORS: (*Hypersonic flow, Hypersonics, Gases, *Entropy, Theory.) (*Blunt bodies, Conical bodies.) (Boundary layer, Shock waves, Wedges, Mach number.)

The method of inner and outer expansions was used in obtaining uniformly-valid solutions far downstream from the blunt nose of slender bodies in hypersonic flow. Application of this technique on the inverse problem, which prescribes the shock wave leaving the body to be determined, results in a unique treatment of the flow field. The influence of nose (shock) bluntness on the flow field and body shape is found to be significant due to the formation of a layer of low density, high entropy air enveloping the body. This entropy layer is in many respects analogous to Prandtl's viscous boundary layer. Analytical solutions, which assume an inviscid perfect gas and infinite Mach number were obtained for hyperbolic and power-law shock wave shapes. The hyperbolic shocks correspond to flows past

blunted wedges and cones in two and three dimensions, respectively. The second-order results for these two cases yield a displacement thickness due to the entropy layer. The blunt body that produces a paraboloidal shock is found to grow as a small power of the distance. (Author)

AD-264 508 Div. 9, 27
(TIPSE/WAW) OTS price $12.00

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AERODYNAMIC IMPROVEMENT OF THE STEAM AND GAS TURBINE BLADE APPARATUS (Aerodinamicheskoye Sovershenstvovaniye Lopatochnykh Apparatov Parovykh I Gazovykh Turbin),
by Ye. A. Gukasova, M. I. Zhukovskiy and others. 22 Aug 61, 159p. incl. illus. tables (Trans. no. MCL-912 of Gosudarstvennoye Znergeticheskoye Izdatel'stvo Moskva:pp. 87-99, 198-218, 245-285, 1960)
Unclassified report

DESCRIPTORS: (*Gas turbines, Steam turbines, *Gas turbine rotors, *Steam turbine rotors, *Gas turbine blades, *Steam turbine blades, *Gas flow, Aerodynamics, Supersonics, Analysis.) (Theory of Model tests.) USSR, Technological intelligence, Translations.

AD-264 544 Div. 9, 10, 25, 27
(TIPSM/EJH) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R.
Quarterly progress rept. no. 9, 1 Apr-30 June 61, 30 June 61, 33p. incl. illus. (Rept. no. TG331-9)
(Contract NOrd-7386)
(ARPA Order no. 22-59, Task 5)
Unclassified report

DESCRIPTORS: (High temperature research, *Rocket motors, *Solid rocket propellants, *Combustion chamber gases, *Exhaust gases, *Gases, Mixtures, Nitrogen, Carbon dioxide, *Thermal conductivity, Heat transfer.) (*Rocket motor nozzles, Solid rocket propellants, *Combustion chamber gases, *Exhaust gases, Gases, Chemical reactions, Reaction kinetics, Recombination reactions, *Fluid mechanics, Infrared spectroscopy.) (*Gas flow, Boundary layer, Laminar boundary layer, Gas diffusion, Transport properties, Thermodynamics, Test equipment, Infrared spectrophotometers, Test methods, Mathematical analysis, Theory.)

Thermal conductivity of gases: High temperature gas thermal conductivity measurements by means of a line source in a laminar flow are being carried out. The theory of the thermal conductivity of binary polyatomic mixtures is outlined. Experimental results on N2, CO2, and N2 - CO2 mixtures are given over a wide temperature range. Rocket nozzle fluid dynamics: Experimental measurement of the flow properties in a rocket nozzle employing a typical solid propellant is discussed. Additional evidence of flow separation near the throat is given. Results of pitot tube boundary layer measurements are presented. Refinements in the IR spectroscopy of the nozzle gas compositions were continued; some spectra are shown. Rocket nozzle chemical kinetics: The purpose of this project is to apply the results of Task R and other research to an analytical study of complex chemical kinetics in the flow of real propellant gases through nozzles. Equations and numerical program for machine calculation are presented. (Author)

AD-264 656 Div. 9
(TIPSM/EJH) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PRELIMINARY EXPERIMENTAL RESULTS OF THE REDUCTION OF VISCOUS EFFECTS IN A LOW-DENSITY SUPERSONIC NOZZLE BY WALL CRYOPUMPING,
by W. N. MacDermott. Oct 61, 46p. incl. illus. (Rept. no. AEDC-TN-61-71)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: (*Supersonic nozzles, *Wind tunnels, *Supersonic wind tunnels, Gas flow, *Boundary layer control, Operation.) (Coolant pumps, Pumps, Cryogenics, Low temperature research.) (Carbon dioxide, Gas flow.) (Nitrogen, Liquefied gases.) Test methods.

A low-density supersonic nozzle was operated with carbon dioxide over a range of supply pressures from 10 to 600 microns and the trasition from a boundary layer-inviscid core flow to a fully developed viscous flow was observed. A liquid-nitrogen cryogenic pump was used to pump the flow through this nozzle. Sizeable reductions of viscous effects in the nozzle flow were observed when the cryogenic pump was extended to the wall of the nozzle. (Author)

AD-264 687 Div. 9, 1
(TIPSE/WAW) OTS price $32.60

General Applied Science Labs., Inc., Westbury, N. Y.
AERODYNAMIC AND STRUCTURAL ANALYSES OF RADOME SHELLS. VOLUME I. AERODYNAMIC ANALYSIS.
Rept. for 8 Jan 57-16 Jan 60 on Radome Technology and Components,
by Martin H. Bloom, Dennis Eisen and others. Feb 61, 655p. incl. illus. table, 51 refs.
(Contract AF 33(616)3956, Proj. 4158)
(WADD TR 59-22, vol. 1)
Unclassified report

DESCRIPTORS: (*Radomes, *Aerodynamics, *Supersonics, *Hypersonics, Compressible flow.) (Pressure, *Aerodynamic heating, *Heat transfer of Turbulent boundary layer, Cooling, Sweat cooling, Convection, Shock waves, Gas ionization, Mathematical analysis, Theory, Reduction.) Hypervelocity vehicles, Airplanes, Guided missiles, Conical bodies, Blunt bodies, Spikes.

An analysis of the aerodynamic and stress problems encountered in the design of radome shells is presented in two volumes. This volume discusses the aerodynamics with special emphasis on the calculation and reduction of heat transfer to the radome. Results are shown for Mach numbers up to 7 and altitudes to 150,000 feet. A chapter on shock layer ionization is also included in which the flow field about a typical radome configuration is studied for Mach numbers of 15 and 20 at altitudes of 150,000 and 200,000 feet. (Author)

10. FUELS AND COMBUSTION

AD-263 924 Div. 10
(TIPSM/EJH) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECTS OF ADDITIVES ON PROPELLANT PERFORMANCE AND MOTOR OPERATING CONDITIONS,
by Charles J. Green. Dec. 0, 22p. incl. tables.
(NOTS TP 2634)
(NAVWEPS rept. no. 7629) Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, *Nitric acid, *Methyl hydrazines, Additives, *Fuel additives, Fuel injection, Exhaust gases, Thrust, Specific impulse.) (*Rocket motors, Liquid rocket propellants, Fuel additives, Combustion chambers, Pressure, Specific impulse, Theory, Tests.) (Chlorine compounds, Fluorides.) (Nitrogen compounds, Tetroxides, Iodine compounds, Fluorides.) (Chlorine compounds, Ethylenes.) (Bromine compounds, Fluorides.) Mercury, Tungsten, Ammonia, Hydrazines, Acetones, Water, Bromine, Tables.

The theoretical performance of inhibited red fuming nitric acid and unsymmetrical dimethylhydrazine with various additives was computed. Performance data were computed assuming a chamber pressure of 1,000 psia with optimum expansion to 14.7 psia. In addition, the effect of additives or of programmed density on motor operating conditions is discussed. With a constant nozzle throat area and a constant propellant flow rate, an additive (introduced to the combustion chamber) increases the chamber pressure significantly. A method for calculating this pressure increase is given. (Author)

AD-264 244 Div. 10, 4
(TIPSM/EJH) OTS price $1.10

Aerospace Corp., El Segundo, Calif.
PROPULSION RESEARCH PROGRAM. HYDRIDE AND FLUORIDE FORMATION BY ATOMIC REACTIONS.
Semiannual technical rept. 1 Jan-30 June 61,
by B. Siegel and R. Tunder. 30 June 61, 3p.
(Rept. no. TDR-594(1201-04)TR-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Hydrides, Rocket propellants, *Metalorganic compounds, *Fluorides, Synthesis, Feasibility studies.) (*Fluorides, *Sulfur compounds, *Complex compounds, Synthesis.) (*Hydrogen, Atoms, Chemical bonds, Reaction kinetics, Chemical reactions with Metals, Metalorganic compounds.) Laboratory equipment.

This phase of the program is designed to provide basic information concerning the feasibility of synthesis of promising propellant ingredients. It is anticipated that the theoretical limits of hydride formation will be established and that the principles governing the best means of incorporating Fl into solid propellants will be determined. Experiments are designed to determine the maximum number of hydrogen bonds that various metals are capable of forming and their stabilities. It is anticipated that the synthesis of model compounds in which Fl is bonded to electronegative ligands will be accomplished. Preliminary experiments on fluoride formation involved a study of the concept of coordinating fluorine into solid-propellants via the use of S as a central coordinating atom for large numbers of highly energetic Fl-containing groups. A successful complex was obtained with tetramethylammonium fluoride. (Author)

AD-264 245 Div. 10, 27
(TIPSM/EJH) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
REVISED OVERPRESSURE CURVES FOR LIQUID OXYGEN AND RP-1,
by W. M. Smalley. 24 Mar 61, 20p. incl. illus.
(Rept. no. TDR-594(1430)TN-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (Rocket oxidizers, *Liquefied gases, *Oxygen, Explosions with Liquid rocket propellants, Pressure, Mathematical analysis.) (*Guided missiles, Explosions, Ballistics.)

Revised overpressure curves for liquid oxygen RP-1 missile explosions have been developed. The overpressure is presented as a function of the total propellant weight and the distance from the explosion. (Author)

AD-264 246 Div. 10, 4, 25
(TIPSM/EJH) OTS price $3.60

Aeronutronic, Newport Beach, Calif.
ENHANCEMENT OF GAS PHASE CHEMICAL REACTION RATE DUE TO SIMULTANEOUS PERIODIC TEMPERATURE AND VOLUME PERTURBATIONS,
by H. M. Wight. Apr 59, 27p. incl. illus. tables.
(Technical note no. U-489)
(Contract AF 49(638)311, Proj. 37510)
(AFOSR TN 59-513) Unclassified report

DESCRIPTORS: (*Rocket motors, Combustion chambers, Combustion, Stability, *Jet acoustic oscillations, Oscillation.) (*Combustion chamber gases, Electromagnetic waves, Wave transmission, Pressure, Temperature, Volume, Chemical reactions, *Reaction kinetics, Thermochemistry.) (*Hydrogen compounds, *Iodides, Gases, Decomposition, Reaction kinetics.) (*Hydrogen compounds, *Bromides, Gases, Synthesis, Reaction kinetics.)

A research study was made of the effect of simultaneous temperature and volume variations on gas phase chemical systems having well established kinetics. The specific systems selected for study were (1) the decomposition of HI; and (2) the direct synthesis of HBr. A theoretical analysis was made which predicts reaction rate enhancements should occur for systems subjected to periodic perturbations in volume and temperature. The enhancement arises essentially from the non-linear temperature dependence of the rate constants. For a chain reaction such as HBr synthesis, the predicted rate enhancement falls off mildly with an increase in the perturbation frequency. (Author)

AD-264 247 Div. 10, 27, 25, 30
(TIPSM/EJH) OTS price $3.60

Aerojet-General Corp., Azusa, Calif.
THEORETICAL AND EXPERIMENTAL STUDIES OF GAS DYNAMICS.
by K. Sato. June 59, 32p. incl. illus. (Rept. no. 1604)
(Contract AF 49(638)252, Proj. 37515)
(AFOSR TR 59-65) Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Rocket motors, *Combustion chambers, Oscillation, *Jet acoustic oscillations, Liquid rocket propellants, Combustion, Stability.) (Mixtures, *Rocket oxidizers, Gases with *Rocket fuels, Drops, Shock waves, Chemical reactions, Photographic analysis.) (*Rocket oxidizers, *Nitrogen compounds, *Dioxides, *Tetroxides.) (*Liquid rocket propellants, *Methyl hydrazines, *Drops, Scattering.) (*Water, *Drops, Scattering.) (*Shock waves, Reflection, Velocity, Drops.) (Test methods, Test equipment, Shock tubes, High speed cameras.) Gas flow, Thermodynamics.

The primary objective of the program was to determine the conditions necessary to obtain a rapid chemical reaction in the immediate vicinity of a shock wave. The initial shock wave, generated in the gaseous oxidizer, was allowed to disperse the injected fuel droplets and to raise the temperature and pressure of the fuel-oxidizer mixture. It was then reflected from the end of the shock tube and allowed to pass through the dispersed fuel droplets and oxidizer. The course of the reflected shock wave was followed photographically to determine the degree of chemical reaction of the fuel-oxidizer mixture. Results showed that the chemical reaction between the fuel and oxidizer was observed only after the passage of the reflected shock wave. (Author)

AD-264 248 Div. 10
(TIPSM/EJH) OTS price $8.60

Aerojet-General Corp., Sacramento, Calif.
STUDY OF MECHANICAL PROPERTIES OF SOLID ROCKET PROPELLANT.
Quarterly rept. no. 2, 1 May-28 July 61.
Oct 61, 86p. incl. illus. tables, 13 refs.
(Rept. no. 0411-10Q-2)
(Contract AF 33(600)40314)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Propellant grains, Binders, Polymers, Urethanes, Design, Structures, Mathematical analysis.) (*Solid rocket propellants, *Propellant grains, Porosity, Mechanical properties, Tensile properties, Deformation, Elasticity, Plasticity, Storage, Aging, Processing, Stresses, Failure (Mechanics), Test methods, Photoelasticity, Gels, Test equipment.)

Efforts were continued to integrate mechanical property behavior of the propellant, and structural analysis of propellant grains with grain design and propellant development. Description of the properties through relations of the three strain invariants appears to offer promise of describing real propellant behavior in a form suitable for structural analysis involving large strains. For small strains without significant dilatation, computer solutions give good agreement with observed strains and with two-dimensional photoelastic analysis. Failure data at constant rates down to 1/0.0005 min. are obtained in the newly developed very-low-rate tester, which, together with available high-rate test equipment, covers the full range of strain rates observed in motors from firing down to temperature cycling conditions. (Author)

AD-264 506 Div. 10, 27
(TIPSM/SEB) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE COMPRESSIBILITY OF MOTOR FUELS, by I. V. Astakhov. 28 Aug 61, 16p. incl. illus. (Trans. no. MCL-1288 of Energomashinostroeniye 9:8-11, 1960)
Unclassified report

DESCRIPTORS: (*Diesel engines, Fuels.) (*Fuels, Fuel oil, Kerosene, Gasoline, Physical properties, Density, Pressure, Compressible flow, Compression shock, Theory, Mathematical analysis, Equations.) (Diesel engines, Design.) USSR, Technological intelligence, Translations.

The compressibility of motor fuels does not obey Hooke's law; the lower the specific gravity of the fuel, the greater its compressibility departs from Hooke's law. For relatively heavy fuels with specific gravity from 1 to about 0.835 kg/liter the dependence of alpha upon the pressure is not so great. This provides the basis for the calculations of injection of these fuels by existing methods, taking into account compressibility of average alpha. In the calculation of injection of fuel with a specific gravity of less than 0.835 kg/liter to neglect the dependence of alpha upon the pressure will cause a significant error in the calculation and shows the need of some correction in existing methods of calculation. In the choice of a value for the velocity of sound for the calculation of injection and of the coefficient of compressibility it is necessary to take into account the specific gravity of the fuel. (Author)

AD-264 509 Div. 10
(TIPSM/SEB) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
EVAPORATION AND COMBUSTION OF A SINGLE-COMPONENT FUEL IN A CHAMBER OF A LIQUID ROCKET ENGINE ZHRD, by S. M. Il'yashenko. 28 Aug 61, 18p. incl. illus. (Trans. no. MCL-1168 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika 4:72-82, 1960)
Unclassified report

DESCRIPTORS: (Theory of Evaporation, Combustion of *Liquid rocket propellants, *Fuel sprays in Combustion chambers of Rocket motors.) (Fuel injection, Sprays, Drops, Determination, Measurement.) (Mathematical analysis, Equations.) (Technological intelligence, Translations on USSR.)

An evaporation and combustion theory of a single-component liquid fuel in a ZhRD chamber was developed, which permits certain conclusions on the effect of spraying parameters as well as the physical properties of fuels and combustion products on the chamber and its characteristics. By decreasing the size of the drops, the combustion zone length in ZhRD chamber decreases. When the evaporation rate of very fine sprays becomes greater than the mass velocity because of microdiffusional turbulene combustion, the theory does not apply. With an increase of the liquid-fuel mass flow and heat conductivity of gases, the evaporation and combustion rates rise, but with the growth of gases' heat capacity and viscosity and the elevation of the fuel's density, the evaporation and combustion rates decrease. The calculated zone length for the evaporation and combustion of drops of a single-component or a previously intermixed liquid fuel is close to the length of a ZhRD chamber. (Author)

Division 11 - GROUND TRANSPORTATION EQUIPMENT

AD-264 545 Div. 10, 4
(TIPSM/EJH) OTS price $6.60

Air Products, Inc., Allentown, Pa.
A PURITY ANALYSIS SURVEY OF CAPE CANAVERAL LIQUID OXYGEN.
Progress rept. no. 7, Jan-Mar 61,
by W. L. Ent and C. J. Sterner. Apr 61, 59p. incl. illus. tables.
(Contract AF 33(616)6730)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, *Oxygen, *Liquefied gases, Contamination, Chemical impurities, Methanes, Acetylenes, Hydrocarbons, Solidified gases, Carbon dioxide, Moisture, Nitrogen compounds, Oxides.) Specifications, Sampling, Chemical analysis, Infrared spectroscopy, Spectrographic analysis, Handling, Storage tanks.

Liquid oxygen, as generated and stored at Cape Canaveral, Florida, was sampled and analyzed regularly for a period of 3 months. Samples were procured with approved cryogenic samplers from the liquid oxygen generation facility and from 6 pre-selected launch complex storage tanks. Results of analyses indicate: (1) a negligible build-up in contaminant concentration between the generation facility and the launch complex storage tanks; (2) a loss of purity due to nitrogen pressurization at the launch complex storage tanks; and (3) the presence of CO2 above its solubility limit in all of the samples procured. (Author)

AD-264 547 Div. 10, 30
(TIPSM/EJH) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
FUNDAMENTALS OF LIQUID PROPELLANT SENSITIVITY.
Quarterly rept. no. 1, 13 June-13 Sep 61,
by T. A. Erikson and E. L. Grove. 29 Sep 61, 23p. incl. tables (Rept. no. ARF 3197-3)
(Contract NOw 61-0603-c)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, *Nitroglycerin, Sensitivity, Detonation, Test methods.) (Test methods, Vapor pressure, *Surface tension, Heating, *Ultraviolet radiation, *Photolysis, *Photochemical reactions.) (Test equipment, Shock tubes.) Time, Temperature, Pressure, Molecular structure.

Surface tension changes of 1 dyne/cm were measured on freshly and carefully prepared nitroglycerine samples upon exposure to ordinary laboratory atmospheres for less than 24 hr. A similar change also was detected on a 3-month-old batch. This evidence seems to confirm the suspicion that surface contamination may explain the inconsistencies in shock-tube testing of nitroglycerine to date. Heating rates to 3000 C/min caused by UV exposure did not cause the detonation of small nitroglycerine samples. Heating rates of 500 C/min caused by ordinary thermal heating on black body converters of the UV caused detonation, indicating that UV exposure suppresses the tendency to develop a nitroglycerine detonation. (Author)

AD-264 655 Div. 10, 4
(TIPSM/EJH) OTS price $6.60

Aerojet-General Corp., Azusa, Calif.
STUDY OF MIXED FLUORINE-OXYGEN OXIDIZERS FOR LIQUID PROPELLANTS,
Rept. for June-Dec 60,
by Donald D. Smith and Ralph W. Lawrence. Feb 61, 63p. incl. illus. tables, 23 refs. (Rept. no. 1952)
(Contract AF 04(611)5964, Proj. 3148)
(AFFTC TR 61-28) Unclassified report

DESCRIPTORS: (Rocket motors, Liquid rocket propellants, *Rocket oxidizers, Combustion, Exhaust gases, Thermochemistry, Specific impulse.) (*Boron compounds, *Fluorides, Chemical reactions with *Boron compounds, *Oxides.) (*Boron compounds, *Oxyfluorides, Polymers, Heat of formation, Thermochemistry, Molecular structure, Molecular weight, Molecular spectroscopy.) Reaction kinetics, Chemical equilibrium, Chemical reactions, Infrared spectroscopy, Test methods, Test equipment, Vapors.

Equilibrium studies of the reaction of BF_3 with B_2O_3 have shown that between 473 and 800 K the trimeric form of metaboryl fluoride is the major species. Above 800 K, the reaction becomes complex, forming O-B-F species other than or in addition to monomeric metaboryl fluoride. The heat of formation of trimeric metaboryl fluoride vapor was calculated from equilibrium data to be -559 ±1.5 kcal/mole at a mean temperature of 600 K or -570 ±1.5 kcal/mole at 298 K. Performance calculations were conducted to obtain theoretical specific impulse, chamber and exhaust temperatures, and combustion species at several mixture ratios. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-264 502 Div. 11
(TIPSB/LH) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
BULLETIN OFF TECHNICAL AND ECONOMIC INFORMATION (SELECTED ARTICLES).
1 Sep 61, 30p. incl. illus. (Trans. no. MCL-1278 of Byulletin Tekhniko-Ekonomicheskoy Informatsii 9:4-6, 1960)
Unclassified report

DESCRIPTORS: (*Geology, *Mining engineering, *Industrial equipment, Tractors, Bulldozers, Fork lift vehicles, Hoists.) Translations, USSR, Technological intelligence.

12. GUIDED MISSILES

AD-263 968 Div. 12, 25, 15
(TIPSP/WH) OTS price $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOME ORBITAL ELEMENTS USEFUL IN SPACE TRAJECTORY CALCULATIONS,
by William Kizner. 25 July 60, 27p. incl. illus. (Technical release no. 34-84)
(Contract NASw-6)
Unclassified report

DESCRIPTORS: (Spaceships, Satellite vehicle trajectories, *Orbital flight paths, Space flight, Lunar probes.) (Mathematical analysis, *Differential equations, Matrix algebra, Equations of Motion, *Celestial mechanics, Vector analysis.)

A set of orbital elements is described which is applicable when the motion is hyperbolic and even rectilinear, such as the motion associated with a lunar landing. This set provides a convenient description of miss distance and furnishes simple relationships for many complex geometrical problems in lunar and interplanetary flight. The use of these elements with others which are described enables the computation of a variety of differential corrections. (Author)

AD-264 008 Div. 12, 15, 25
(TIPSP/WH) OTS price $7.60

Land-Air, Inc., Point Mugu, Calif.
PROCEDURE FOR MULTIPLE INTERFEROMETER DETERMINATION OF TRAJECTORIES (MIDOT),
by D. D. Keller, ed. by A. L. Powell. 12 June 61, 67p. incl. illus. tables (Rept. no. 27)
(Contract N-123(61756)19425A)
Unclassified report

DESCRIPTORS: (*Guided missile trajectories, Determination, Instrumentation, *Interferometers.) (Tracking, Telemetering transmitters, *Telemeterming data, *Data processing systems, Digital computers, Programming.)

The instrumentation system is described. The theory of operation and supporting mathematics is presented to explain the resulting oscillograph records. Peak deflections vs a time base are traced, representing points of integral change in frequency difference between signals received at each end of a baseline. The process uses rate of change derived from timing the deflections associated with the X and Y baseline signals to compute direction cosines. The procedure offers a triangulation process for computing position using data from two or more stations and a method of least squares fit. Working forms for recording readings, transformation details, and key punch information are illustrated. (Author)

AD-264 034 Div. 12, 8, 6
(TIPSE/CCD) OTS price $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
(No title).
Annual summary rept.
1 June 61, 21p. incl. illus. (Rept. no. 1116-8)
(Contract AF 19(604)7270)
(AFCRL 749) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Radar echo areas, Radar targets, Measurement, Plasma physics, Dielectrics.) (Electromagnetic wave reflections, Refraction, Scattering, Measurement.) (*Ionosphere, Ionospheric propagation, Ionospheric disturbances, Particles.) (*Aerodynamic configurations, Spheres, Cylindrical bodies.)

Research was conducted to determine the scattering properties of a rapidly moving vehicle in the presence of a perturbed ionized environment by investigating the change in radar echo area caused by the presence of a plasma sheath. Approximate methods based on physical concepts were evolved for determining the echo area of conducting spheres surrounded by concentric dielectric shells. The approximate echo areas were in good agreement with exactly computed results, however several discrepancies did occur. The exact bistatic echo areas of conducting spheres are being computed for use in determining approximate methods for computing the bistatic echo area of spherical configurations. Computations of the echo area of concentric circular cylinders of infinite length are expected to further demonstrate the validity of the approximations. Methods of solution are described for the near end-fire echo area of long-thin bodies with a dielectric shell.

AD-264 040 Div. 12
(TIPSE/NTM) OTS price $9.10

Philco Corp., Palo Alto, Calif.
PROGRAM PLAN. MIDAS ACCELERATED RELIABILITY PROGRAM. VEHICLE C AND C EQUIPMENT.
27 Jan 61, 106p. incl. illus. (Rept. no. WDL-TR1471)
(Contract AF 04(647)532)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, Reliability.) (*Reliability, Design, Radio receivers, Crystal mixers, Life expectancy, Ultra high frequency, *Radiofrequency filters, Failure (Mechanics), Quality control, Tests.)

Four major analytical tasks for the augmented MIDAS reliability effort either have been or will be undertaken. They are a design-concept review, a developmental program, a series of design reviews, and a production reliability-assurance program. Each of these major tasks is discussed. (Author)

AD-264 168 Div. 12
(TIPSP/GRW) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
FIRST FLIGHT TO VENUS,
tr. by Z. Jakubski. Mar 61, 20p. incl. illus. table (Rept. no. STL-TR 61-5110-9, Trans. from Pravda, No. 57 (15547) 26 Feb 61)
Unclassified report

DESCRIPTORS: (*Spaceships, Automatic, Instrumentation, *Space flight, Venus by USSR.) (Orbital flight paths, Determination.) (Position finding and Launching, Space probes by Astronomical data of Earth, Venus.)

AD-264 192 Div. 12
(TIPSB/MS) OTS price $16.00

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
BY ROCKET TO THE MOON (Raketoy K Lune),
by V. I. Levantovskiy. Apr 60, 236p. incl. illus. table, 11 refs. (Trans. no. MCL-879, pt. 1 of Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury, Moscow: 395p., 1960)
Unclassified report

DESCRIPTORS: (*Spaceships, Space capsules, Artificial planetoids, *Satellite vehicles, Satellite rendezvous vehicles, Satellite vehicle trajectories, Rocket propulsion, Space probes, *Lunar probes, *Space navigation, *Astronautics, Orbital flight paths, *Space flight.) (*Moon, Solar systems, Planetary atmospheres, Space environmental conditions, Interstellar matter, Extraterrestrial bases, Extraterrestrial geography, Exploration.) (USSR, Technological intelligence, Translations.)

AD-264 298 Div. 12, 30
(TIPSP/WFA) OTS price $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ATTITUDE CONTROL OF EARTH SATELLITES,
by A. R. Maxwell Noton. 3 June 58, 45p. incl. illus. tables (External Publication no. 505)
(Contract DA 04-495-ORD-18, ORDCIT Proj.)
Unclassified report

DESCRIPTORS: (Satellite vehicle research, Satellite attitude, *Satellite vehicles, Rockets, Rocket propulsion, Rocket propellants.) (*Control systems, *Servomechanisms, Gimbals, Gyroscopes, Telescopes.) (*Axially symmetric flow, Roll, Yaw, Pitch.) *Instrumentation.

Three schemes for stabilizing a satellite are evaluated. Scheme 1 consists of: (1) a two-gimbal gyro with its axis in a steady state perpendicular to the orbital plane, and (2) a one-gimbal gyro parallel to the satellite roll axis to detect pitch of the satellite. Scheme 2 is a variation of Scheme 1, viz., in the time required to orient the satellite correctly about all three axes. The stabilization time of Scheme 2 is much faster than that of Scheme 1. Scheme 3 is based upon the principle of the gyroscopic inertia method of roll-stabilization.

AD-264 442 Div. 12, 19
(TIPSE/DLW) OTS price $4.60

Raytheon Co., Sudbury, Mass.
INVESTIGATION OF ACTIVE DOPPLER VELOCITY SENSOR.
Quarterly engineering rept. no. 5, 1 June-30 Aug 61.
Sep 61, 34p. incl. illus. tables (Rept. no. AED-455)
(Contract AF 33(616)7388)
Unclassified report

DESCRIPTORS: (*Hypervelocity vehicles, *Spaceships, *Doppler navigation, *Doppler radar, *Radar navigation, *Space navigation, Radar equipment, Design, Feasibility studies.) (Space flight, Velocity, Altimeters, Height finding, Range finding, Automatic navigators, Measurement.) (Doppler radar, Radar beacons, Radar receivers, K band, Parametric amplifiers, Intermediate frequency amplifiers, Navigation, Flight testing, Signal-to-noise ratio.) (Spaceships, Moon, Landing, Safety devices.)

Integration testing of the demonstration radar and transponder was continued. The second series of spectral compression flight tests was conducted and the results analyzed. Theoretical investigation of ranging techniques continued, and some experiments were conducted. Optimum filtering studies and the development of frequency tracker (incorporating the results of the optimum filtering studies) also was continued. Final measurements were made on the 13.5 kmc parametric amplifier, and performance tests were conducted on the completed, wide-dynamic-range, IF amplifier. (Author)

AD-264 654 Div. 12
(TIPSE/RD) OTS price $4.60

General Dynamics/Convair, San Diego, Calif.
AEROSPACE VEHICLE WING PANEL WEIGHT OPTIMIZATION STUDY.
Sep 61, 41p. incl. illus.
(Request for proposal AF 33(657)-62-5015Q)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, Airframes, Propulsion, Aerodynamics, Manned, Design.) (Wings, Design, Load distribution.) (Digital computers, Effectiveness.) (Materials, Titanium, Nickel alloys, Niobium.)

The objective of the study is to develop a simple and useful method of determining the optimum weights of wing panels for use in the preliminary design evaluation of advanced aerospace vehicles. An advanced aerospace vehicle is interpreted to mean a manned-recoverable single of staged booster as the most representative of future needs. The proposal is based on the premise that advanced aerospace vehicle wing panel weights are functions of basic loads, secondary loads, minimum gages, and thermal/meteorite protection requirements, any one of which may predominate. Recognition is made of the cross effects of these requirements among themselves, and also the higher-order tradeoffs between structures, aerodynamics, and propulsion. A series of simplified analyses, to account for wing weights due to the 4 requirements discussed, in proposed. These analyses are to include all basic or key parameters affecting wing structure weight, on a preliminary design basis. These analyses are then programmed for a digital computer to handle all routine mathematics. The 4 basic weight influence programs are then coupled to allow simultaneous combination of these influences. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-263 925 Div. 13, 31
(TIPSM/EJH) OTS price $.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
TEMPERATURE EFFECT ON VAPOR-COMPRESSION DISTILLATION.
Final rept.,
by J. W. Burdick and J. S. Williams. 15 Sep 61, 8p. incl. illus. table (Technical rept. no. 160)
Unclassified report

DESCRIPTORS: (*Distilling plants, *Sea water, Temperature, Arctic regions, Operation, Tests.)

Comparison of data from tests made at normal room temperatures with data from tests conducted in the cold chamber at NCEL provided reasonable proof that cold feed-water alone was not responsible for marked reduction in vapor-compression distillation unit output. These tests showed that low ambient temperatures coupled with air movement increased heat losses and thereby reduced the fuel economy of such units to a marked degree. (Author)

AD-264 389 Div. 13, 14, 31
(TIPSM/EJH) OTS price $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
INVESTIGATION OF MEANS FOR PREVENTING EXPLOSIVE FAILURES OF CASTABLE REFRACTORY.
Final rept.,
by R. C. Burt. 28 Sep 61, 13p. incl. tables.
(Proj. no. R-297)
Unclassified report

DESCRIPTORS: (*Boilers, Refractory materials, Castings, Binders, Additives, Failure (Mechanics).) (*Refractory materials, *Castings, Aging, Low temperature research, Moisture, Failure (Mechanics).) (*Binders, Calcium compounds, Aluminum compounds, Oxides.) (*Additives, Sodium compounds, Lignin, Sulfonates.) Steam, Explosions, Test methods.

It was concluded that explosive rupture of castable refractory installations during their initial heating period can be prevented by the addition of a small proportion of sodium lignin sulfonate. The minimum proportion of additive required, 0.05 to about 0.10%, causes no adverse effects on the refractory, but excessive amounts might cause decreased strength. (Author)

AD-264 619 Div. 13
(TIPSB/CW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ERECTION OF PRECAST REINFORCED CONCRETE STRUCTURES (Montazh Sbornykh Zhelesobetonnykh Konstruktsiy) CHAPTER V. ASSEMBLING EQUIPMENT AND CRANES,
by Ya. R. Bresser and V. P. Proskurnin.
13 Sep 61, 36p. incl. illus. tables (Trans. no. MCL-1050 of Montazh Sbornykh Zhelesobetonnykh Konstruktsiy, Moskva, pp. 187-213, 1958)
Unclassified report

DESCRIPTORS: (*Reinforced concrete, *Structures, Construction, *Hoists, *USSR, *Technological intelligence.) *Translations.

14. MATERIALS (NON-METALLIC)

AD-263 927 Div. 14
(TIPSB/LH) OTS price $1.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
PROPOSED REVISION OF MILITARY SPECIFICATION MIL-R-18553(Aer),
by A. J. Koury. 11 Sep 61, 20p. incl. tables.
(Rept. no. NAMC AML 1258)
Unclassified report

DESCRIPTORS: (*Specifications, Military requirements, Standards, *Paint removers, Tests, Test methods.)

AD-263 962 Div. 14, 25
(TIPSM/EJH) OTS price $1.60

Systems Research Labs., Inc., Dayton, Ohio.
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES.
Bimonthly progress rept. no. 4,
by Robert W. Vest. 20 Sep 61, 12p. incl. illus. table (Rept. no. 203-4)
(Contract AF 33(616)7748)
Unclassified report

DESCRIPTORS: (*Refractory materials, *Ceramic materials, High temperature research, Electrical conductance, Ions, Electrons.) (*Crystals, *Single crystals, *Zirconium compounds, *Titanium compounds, Dioxides, Oxides, Chemical impurities, Preparation, *Electrical conductance, Ions, Electrons, Test methods, Electrodes, Platinum.) (*Single crystals, *Titanium compounds, Dioxides, Sapphires, Aluminum compounds, Oxides, Sodium compounds, Chlorides, Electrodes, Preparation.) Laboratory equipment.

The electrical conductivity of a calcia stabilized zirconia polycrystalline sample was plotted as the logarithm of the conductivity versus reciprocal absolute temperature. The high temperature data lie on a straight line and yield an activation energy of 1.2 ev. Divergence from a straight line at lower temperatures indicates a different conduction mechanism, i.e., electronic which contributes to the total measured value. Transport numbers for electrodes obtained from polarization measurements showed that above 700 C the conductivity is nearly 100% ionic (O ions). Voltage curves at constant current were taken to determine the transport numbers of a cut of a single crystal of TiO2 and a cut of polycrystalline stabilized zirconia. Results at 500 C indicated 79% electronic conductivity in the single crystal and 81% in the sintered ceramic. The time constant of the polarization was shorter in the polycrystalline sample.

AD-264 139 Div. 14, 25, 1
(TIPSM/SEB) OTS price $.50

Naval Research Lab., Washington, D. C.
SHEAR CHARACTERISTICS OF ICE IN BULK, AT ICE/SOLID INTERFACES, AND AT ICE/LUBRICANT/SOLID INTERFACES IN A LABORATORY DEVICE,
by T. F. Ford and O. D. Nichols. 18 Aug 61, 12p. incl. illus. tables, 15 refs. (NRL rept. no. 5662)
Unclassified report

DESCRIPTORS: (*Ice, Adhesion to Alloys, Metals, Lubricants, Shear stresses, Tests, Test methods, Test equipment.) (Surfaces, Stainless steel, Brass, Aluminum.) (Lubricants, Coatings, Films.) (Polymers, Ethylenes, Fluorides.) (*De-icing materials, Esters, Sebacic acid, Glutaric acids, Sulfonic acids, Stearates.) (Polymers, Ethers, Phenyl radicals.)

An apparatus designed for measuring the shear strength of ice frozen to solid surfaces and the bulk shear strength of ice is described. Various lubricants on solid surfaces greatly reduce adhesion and yield breaks that are purely adhesional in nature. In some instances no measurable adhesion was observed. Solid surfaces included stainlss steel, brass, Al, and Al coated with Teflon. Liquid surface films were formed with bis(2-ethylhexyl) sebacate (Plexol 201), bis(psi prime-C5) glutarate, HB-49(Terphenyl), polyphenyl ether, isopropyl biphenyl, and 1-percent solutions of sodium dinonylnaphthalene sulfonate and barium phenylstearate in bis(2-ethylhexyl) sebacate. (Author)

AD-264 144 Div. 14, 20
(TIPSP/JDP) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
RADIATION OF SELECTED POLYMERS AND MODEL COMPOUNDS.
Summary technical rept. no. 1, 1 Apr 60-1 Apr 61,
by Harry E. Redeker and Dale E. Van Sickle.
30 Apr 61, 46p. incl. illus. tables, 12 refs.
(Contract DA 04-200-ORD-1056, Proj. TB4-721)
Unclassified report

DESCRIPTORS: (*Phenolic resins, *Electron bombardment, *Radiation damage, *Gamma rays, *Epoxy resins.) (Chemical properties, Physical properties, Phenolic resins, Epoxy resins.) (Polymers, Phenoxy radicals, Amines, Ethyl radicals, Propanols, Electron bombardment, Hydroxides, Diphenylmethanes.) (Radioactivation analysis, Stereochemistry.)

Chemical investigation of phenolic resins was made using a model compound approach. Monomers or linear polymers of known structure were subjected to either electron bombardment or gamma irradiation, and the chemical and physical changes produced were followed. The effects of electron bombardment and gamma radiation were investigated on phenolic compounds. Experiments were performed on 1-phenoxy-3-diethylamino-2-propanol, an epoxy resin model compound, and a methanol solution of 2,2' -dihydroxydiphenylmethane. Electron bombardment was also done on these two systems, to allow comparison of effects resulting from the two particle types. (Author)

AD-264 193 Div. 14, 12
(TIPSM/REB) OTS price $45.75

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATERIALS SYMPOSIUM, 13-15 SEPTEMBER 1961, PHOENIX, ARIZONA.
July 61, 914p. incl. illus. tables (Rept. no. ASD TR 61-322)
Unclassified report

DESCRIPTORS: (*Materials, *Symposia.) (Space environmental conditions, Solar energy, Thermal radiation, Radiation effects, Ablation on *Satellite vehicles, Spaceships, Airframes, Structural shells, Electronic equipment, Power supplies, Solar cells, Thermoelectricity, Fuel cells, Materials, Metals, Alloys, Heat resistant alloys, Refractory materials, Lubricants, Fluids, Flotation.)

Contents:
Space environment
Structural materials
Electronic material requirements
Flight vehicle power
Improving the mutual guidance and support between the fields of materials and design

AD-264 273 Div. 14, 12
(TIPSM/BRW) OTS price $4.60

Bjorksten Research Labs., Inc., Madison, Wis.
HIGH VISCOSITY REFRACTORY FIBERS.
Quarterly rept. no. 7, 1 May-31 July 61,
by Stanley A. Dunn and William P. Roth.
31 July 61, 22p. illus. tables.
(Contract NOrd-19100)
Unclassified report

DESCRIPTORS: (High temperature research on *Refractory materials, Insulating materials, Thermal insulation, *Ceramic fibers.) (Aluminum compounds, Oxides, Silicon compounds, Dioxides, Additives of Copper, Chromium compounds, Molybdenum compounds, Silicides.) (Tests, Test methods for Viscosity, Determination by Deformation, Measurement on Fibers, Rods, Ablation by Photographic analysis.) Guided missile noses, Rocket motor nozzles.

Viscosity determinations on mixtures of silica with dispersed Cu at 3 concentrations (0.1, 3, and 10%) were made by fiber and rod elongation techniques. Coarse dispersions of Cu lower the iscosity of silica but fine dispersions may raise it. With essentially convective heating, such as in an open gas flame (or nose-cone reentry), even coarse dispersions can show appreciable net viscosity increases due to radiative cooling mechanisms associated with the reflective and emissive properties of the Cu particles. Two other additives, molybdenum disilicide at 10% and Cr2O3 at 5 and 7%, raise the viscosity of silica 2-1/2 to 12-fold. The emissivities and reflective properties of these additives indicate that radiative cooling effects similar to those of Cu would further increase viscosity under convective heating conditions. Oxyacetylene ablation tests were run on bullet shaped samples of plain silica and mixtures of 3 and 10% Cu in silica. The 10% Cu sample showed appreciably more resistance to ablation than either of the other samples and the 3% sample appeared to be more resistant than the plain silica. (Author)

AD-264 367 Div. 14, 31
(TIPSM/EJH) OTS price $5.60

Marine Lab. U. of Miami, Coral Gables, Fla.
ANTIFOULING POTENTIALS OF PESTICIDAL MATERIALS.
Final rept.
Mar 61, 48p. incl. tables (Rept. no. ML-61070)
(Contract NOa(s) 59-6182-c)
Unclassified report

DESCRIPTORS: (*Antifouling coatings, Organic coatings, *Fungicidal coatings, *Antipest impregnants, *Bactericides, Paints, Coatings, *Fungusproofing, Effectiveness, Test methods.) (*Marine biology, Algae, Aquatic animals, Barnacles, Marine borers.) (Test equipment, *Porous materials, *Porous glass, Impregnation, *Antipest impregnants, Diffusion, Sea water.) Fouling, Tropical deterioration, Organic compounds, Metalorganic compounds.

Results of investigations conducted by The Marine Laboratory during the period May 1, 1959 through June 30, 1960, concerning the antifouling potentials of pesticidal materials are presented. The ultimate objective of this program was to select chemicals which used singly or in association with other chemicals would offer complete protection against the entire spectrum of fouling organisms usually found in tropical waters. (Author)

AD-264 446 Div. 14
(TIPSB/CW) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
THE DEVELOPMENT OF HEAT-RESISTANT PAINTS FOR METALS.
Bimonthly progress rept. no. 3, 1 June-31 July 61,
by Stanley E. Mileski and A. E. Raeuber.
15 Aug 61, 10p. incl. tables (Rept. no. 6016-1264-3)
(Contract NOw 61-056-d)
Unclassified report

DESCRIPTORS: (*Heat resistant paints, Preparation with Metallic compounds, Zinc compounds, Oxides, Magnesium compounds, Aluminum, Phosphorus compounds, Ceramic materials, Spinels, Phosphites, Phosphates.) (*Metals, Coatings, *Ceramic coatings, *Phosphate coatings, Temperature, Resistance, Weatherproofing, Failure (Mechanics), Aging, Hardness.)

Progress on a project to prepare and evaluate air-drying, heat-resistant coatings for metal surfaces is reported. The coatings are made by reacting phosphorus compounds with metal oxides or ceramic frits. Coatings based on zinc oxide, dimethyl hydrogen phosphite, and ethyl acid phosphate withstood exposure to weather for 6 mo but failed at 8 mo. Coating thickness has been shown to be an important factor in the formation of satisfactory coatings. X-ray diffraction studies have indicated that zinc oxide is the only crystalline material in coatings prepared from zinc oxide, dimethyl hydrogen phosphite and ethyl acid phosphate. This indicates that the binder material is amorphous in character. Coatings prepared with colloidal alumina or magnesium aluminate spinel in combinations with phosphorus-containing liquids did not cure to dry, homogeneous coatings. Addition of other oxides to coating compositions made with zinc oxide or magnesium oxide as the basic metal oxide has shown promise for improving the hardness of coatings. (Author)

AD-264 449 Div. 14, 20, 12, 27
(TIPSM/BRW) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
EFFECTS OF RADIATION ON FERROELECTRIC AND FERRIMAGNETIC MATERIALS. PART II. FERRIMAGNETIC MATERIALS.
Final rept., pt. 2,
by S. I. Taimuty and J. S. Mills. 15 June 61, 71p. incl. illus. tables, 46 refs.
(Contract AF 19(604)4141)
(AFCRL-351, pt. 2) Unclassified report

DESCRIPTORS: (*Ferroelectric materials, *Ferromagnetic materials, *Ferrites, Magnetic properties, Radiation damage, Radiation effects.) (*Ferrites, *Magnetic materials, Dielectrics, *Garnet, Iron compounds, Samarium, Yttrium compounds, Oxides, *Ferromagnetism, Neutron bombardment, Fast neutrons, *Hysteresis, Space environmental conditions, Simulation by Research reactors.) (Satellite vehicles, Spaceships, Nuclear propulsion, Nuclear power plants, Shielding.)

The effects of reactor radiations on the magnetic properties of 16 polycrystalline ferrites and magnetic garnets were studied. The materials were Ferramic E, I, O-3, S-1, S-3, R-1, R-4, R-5, R-6, and T-1, Ferroxcube 3-C, General Electric 36H, 36L, and 42L, and Y- and Sm-Fe garnets. Hysteresis loops (0.4 to 100 kc) were measured in the Ferramic materials (except R-4, R-5, and R-6), Ferroxcube 3-C and the garnets. In addition, complex permeability (300 to 600 kc) was measured in Ferramic R-1, S-1, and S-3 and Sm-Fe garnet. The effects of radiation on the hysteresis properties were insignificant after exposures below 10 to the 18th power n/sq cm. At 10 to the 18th power n/sq cm, increases in coercive force and remanence were observed. The largest change observed was about 30%. The shapes of the hysteresis loops were not drastically affected. Also, post-irradiation aging and heat treatment were relatively ineffective in annealing the radiation damage. (Author)

AD-264 501 Div. 14, 10
(TIPSM/EJH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METHODS OF INCREASING THE ENERGY CONTENT OF HYDROCARBON FUELS,
by Ya. B. Chertkov. 28 Aug 61, 7p. incl. illus. table (Trans. no. MCL-1300 of Khimiya I Tekhnologiya Topliv I Masel 4:1-4, 1960)
Unclassified report

DESCRIPTORS: (*Fuels, Mixtures, Fuel additives, *Hydrocarbons, *Benzenes, Monocyclic compounds, Polycyclic compounds, Combustion, Energy.) (*Fuels, Hydrocarbons, Density, Molecular weight, Molecular structure, Combustion.) (USSR, Technological intelligence, Translations.)

The energy content of hydrocarbon fuel can be estimated efficiently using only the heat of combustion per unit volume. The most effective method for increasing the energy content of hydrocarbon fuel is to add the maximum amount of aromatic hydrocarbons with high density. Operations must be developed to seek methods of improving the properties of aromatic hydrocarbons during their combustion in an engine. (Author)

AD-264 602 Div. 14, 26
(TIPSM/EJH) OTS price $5.60

General Electric Co., Cincinnati, Ohio.
THE EFFECT OF ARC PLASMA DEPOSITION ON THE STABILITY OF NON-METALLIC MATERIALS.
Final rept., Apr 60-May 61,
by B. E. Kramer, M. A. Levinstein, and J. W. Grenier. May 61, 57p. incl. illus. tables.
(Contract NOa(s) 60-6076-c)
Unclassified report

DESCRIPTORS: (*Graphite, *Refractory coatings, Coatings, *Ceramic coatings, *Refractory materials, *Ceramic materials.) (Aluminum compounds, Cerium compounds, Chromium compounds, Hafnium compounds, Niobium compounds, Tantalum compounds, Titanium compounds, Zirconium compounds, *Oxides, *Borides, Carbides, *Nitrides.) (*Plasma jets, *Flame spraying.) Mechanical properties, Stability, Hardness, Thermal expansion, Density, Crystal structure, High temperature research, Air blast, Electrical properties, Lattices.

The oxides of Al, Cr, Zr Ce, Hf and mixtures of Zr and Nb; the carbides of Hf, Ta and Zr; the nitrides of Ti and Ta; and the boride of Zr can be sprayed on a graphite substrate without chemical or microstructure alteration; the operating conditions for the deposition of these materials were determined. Properties useful in design data: the coefficient of thermal expansion, density, compressive strengths, electrical resistance and hardness were obtained.

Division 15 - MATHEMATICS

The resistance of the deposited coatings to a 5000 F, high velocity, air blast was determined as well as the static oxidation behavior. Alumina, chromia and zirconium boride conferred resistance to a graphite substrate in the blast test. The carbide and nitride did not withstand the oxidation erosion test. (Author)

AD-264 627 Div. 14, 8
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
EFFECT OF POROSITY ON THE PROPERTIES OF FERRITE CORES,
by V. G. Glotov. 20 Sep 61, 14p. incl. illus. (Trans. no. MCL-1234 of Vestnik Elektropromyshlennosti 1:34-38, 1961)
Unclassified report

DESCRIPTORS: (Magnetic cores, Memory devices, *Ferrite cores, *Ferrites, Magnesium alloys, Manganese alloys, Iron compounds, Oxides, Processing.) (Powder metallurgy, Powders, Binders, Sintering, Pressure, Crystallization, Porosity.) (Porosity, Electromagnetic properties, Hysteresis.) (Technological intelligence, Translations, USSR.) Signal-to-noise ratio.

Conclusions: Maximum rectangularity of hysteresis loops of ferrite cores is obtained with optimal porosity assigned by the binding substance. Differences in the porosity of pressings affects dimensions but has no bearing on the rectangularity of hysteresis loops of cores. On the basis of the results obtained it is possible, in the case of mass production, to correct consignments of small-size cores. (Author)

AD-264 659 Div. 14, 4, 9, 1
(TIPSM/EJH) OTS price $4.60

Midwest Research Inst., Kansas City, Mo.
HIGH TEMPERATURE RESISTANT TRANSPARENT PLASTICS,
Quarterly progress rept. no. 2, 15 May-14 Aug 61, by Howard Christie and Thomas Medved. 25 Sep 61, 40p. incl. illus. tables.
(Contract NOw 61-0673-d)
Unclassified report

DESCRIPTORS: (*Transparent panels, *Heat resistant polymers, *Optical plastics, Plastic coatings, *Optical coatings, *Epoxy resins, Acrylic resins, *Resins, *Plastics, Films.) (Resins, Castings of Phthalic acids, Anhydrides and Vinyl radicals, Cyclohexenes, Dioxides.) (Octanes, Epoxides, Synthesis.) Ethylenes, Carboxylic acids, Anhydrides.) (Aircraft finishes, Coatings, Supersonic planes.) Ultraviolet radiation, Radiation damage, Abrasion, Mechanical properties, Stability, Light transmission, High temperature research, Preparation, Tests, Test methods.

Cast resins obtained from hexahydrophthalic anhydride and vinylcyclohexene dioxide were found to be extremely notch sensitive and brittle. Although the ultimate flexural strength of the resin was high (15,000 psi at 75 F), the ultimate tensile strength was low (2,800). Good agreement of tensile and flexural modulus 75 to 400 F was obtained. The UV light stability of 5 epoxide resins and polymethylmethacrylate were compared; all epoxide resins were inferior to the acrylics. Trimethoxyboroxine (TMB) cured diglycidyl ether (DEBA) of bisphenol A proved to be superior in abrasion resistance. Hot stretched acrylic and polymethylmethacrylate were about equal in resistance to the TMB cured DEBA. Synthesis of the bisbicyclo(2.2.2)octane diepoxides was continued. The thermal rigidity of resins obtained from maleic anhydride and the bisbicyclo carbonate diepoxide were evaluated by the Vicat penetration technique. (Author)

AD-264 689 Div. 14
(TIPSB/CCH) OTS price $1.10

Fabric Research Labs., Inc., Dedham, Mass.
A STUDY OF BLENDING AS A MEANS OF EXTENDING THE UTILIZATION OF WOOL.
Final rept.,
by Myron J. Coplan. 25 Oct 61, 5p.
(Contract Nonr-142200)
Unclassified report

DESCRIPTORS: (*Industrial training, Processing of *Wool textiles, Production, Economics, Mathematical analysis, Tensile properties, Elasticity.) Tests.

A study was made of the process of blending wool textiles. The objectives of the over-all program have been successfully met in that a variety of new concepts and research information pertinent to the development of new and better wool blended fabrics and useful in the evaluation of prototype materials came out of the effort. During the period over which this work was carried on the industry at large has acquired a great deal more sophistication; the literature is a great deal more replete today with the types of experimental and theoretical work that were lacking when the program was undertaken. We can only modestly hope that our efforts have added somewhat to general enlightenment in this very broad area. (Author)

15. MATHEMATICS

AD-263 909 Div. 15, 8, 28, 30
(TIPSP/MFA) OTS price $4.60

Research Inst., U. of Michigan, Ann Arbor.
DEFERRED DECISION THEORY,
by H. H. Goode. July 61, 38p. incl. illus. (Technical rept. no. 123; 2899-57-T)
(Contracts DA 36-039-sc-78283, Proj. 3A99-06-001-01 and Nonr-122436)
Unclassified report

DESCRIPTORS: (Statistical analysis, *Probability, Games theory, *Distribution theory, Statistical tests, Sequential analysis.) (Computers, Data, *Statistical data, Electronic scanners, *Radar.) (Difference equations, Integrals.)

The problem examined is the case of the simple

two-alternative decision in which it is allowable to defer decision until further observations have been made. Given the costs of making errors and the cost of deferring a decision, the problem is to determine a course of action which will minimize the expected losses. An iterative algorithm is presented for calculation of decision points. The existence of decision points is proved by proving convergence for the algorithm. Results for Gaussian distributions run on the IBM 704 are included. For the parameters examined it is shown that the decision points converge within four deferrals. (Author)

AD-263 964 Div. 15
(TIPSP/JD) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford, U., Calif.
ON ESTIMATION OF A PROBABILITY DENSITY FUNCTION AND MODE,
by Emanuel Parzen. 21 Aug 61, 25p. incl. table. (Technical rept. no. 40)
(Contract Nonr-22521, Proj. NR-042-993)
Unclassified report

DESCRIPTORS: (Statistical functions, Probability, *Statistical distributions.)

Given a sequence of independent identically distributed random variables with a common probability density function, the problem of the estimation of a probability density function and of determining the mode of a probability function are discussed. Only estimates which are consistent and asymptotically normal are constructed. (Author)

AD-263 991 Div. 15, 26
(TIPSP/TL) OTS price $5.60

Cornell U., Ithaca, N. Y.
SAMPLING PROCEDURES AND TABLES FOR LIFE AND RELIABILITY TESTING BASED ON THE WEIBULL DISTRIBUTION (HAZARD RATE CRITERION),
by Henry P. Goode and John H. K. Kao. Sep 61, 60p. incl. illus. tables (Technical rept. no. 5)
(Contract Nonr-40143)
Unclassified report

DESCRIPTORS: (*Statistical distributions, *Electronic equipment, Statistical analysis, Probability, *Reliability, *Sampling, *Life expectancy, Quality control.) (Time, Tests, Design, Tables, Statistical tests.) *Symposia.

This investigation outlines an acceptance-sampling procedure and presents tables of related sampling-inspection plans for the evaluation of lot quality in terms of the instantaneous failure or hazard rate as a function of time. The Weibull distribuition (including the exponential as a special case) is used as the underlying life-length model. Inspection of sample items is by attributes with life testing truncated at the end of some specified time. Tables of factors are also provided from which sampling plans for instantaneous failure or hazard rate may be designed to meet given needs or from which the operating characteristics for any specified plan may be evaluated. Also included is a discussion of applications in terms of the average hazard rate as a function of time, a measure which turns out to be distribution free. (Author)

AD-264 005 Div. 15, 30
(TIPSP/MFA) OTS price $1.60

Hebrew U. (Israel).
EXISTENCE OF INVARIANT MEASURES FOR MARKOV PROCESSES,
by S. R. Foguel. Apr 61, 9p. (Technical (Scientific) note no. 18)
(Contract AF 61(052)187)
(AFOSR-1282) Unclassified report

DESCRIPTORS: *Statistical processes, Topology, *Measure theory, Functions, Equations, Integrals.

Given a distribution function P(x,A) for a Markov Process, the problem of existence of invariant measures is investigated. Definitions, theorems and proofs are given.

AD-264 006 Div. 15
(TIPSP/MFA) OTS price $4.60

Hebrew U. (Israel).
SOME PROBABILISTIC THEOREMS ON DIOPHANTINE APPROXIMATIONS,
by Harry Kesten. May 61, 43p. (Technical (Scientific) note no. 19)
(Contract AF 61(052)187)
(AFOSR-1283) Unclassified report

DESCRIPTORS: (Statistical analysis, *Statistical distributions, *Probability, Theory.) (Equations, *Number theory, Combinatorial analysis, Integrals, Series, Fourier analysis.)

Some metrical theorems on diophantine approximations are proved. The last theorem concerns simultaneous diophantine approximations. Probability language and expressions are used throughout.

AD-264 018 Div. 15, 30
(TIPSP/MFA) OTS price $2.60

Miami U., Coral Gables, Fla.
A STOCHASTIC TREATMENT OF SOME CLASSICAL INTERPOLATION PROBLEMS,
by J. H. Curtiss. 5 Nov 60, 20p. 17 refs.
(Contract AF 49(638)862)
(AFOSR TN 60-1425) Unclassified report

DESCRIPTORS: (*Numerical analysis, *Probability, Theory of Distribution theory, *Curve fitting.) (Functions, Equations, Integrals, Integral equations, Complex variables, Polynomials, Taylor's series.)

A probabilistic model is set up in which with probability one a sample sequence of points has an equidistribution property. It is found by use of the Jordan curve that for a function with a pole inside the curve but otherwise analytic, the value of L sub n(f,z) (a random variable) for z inside the curve will almost certainly not be near the value in which convergence takes place in deterministic roots-of-unity interpolation. Various asymptotic exppcted value results are also established.

Division 15 - MATHEMATICS

AD-264 032 Div. 15
(TIPSP/MFA) OTS price $1.60

Northwestern U., Technological Inst., Evanston, Ill.
PROJECTION PROPERTIES AND NEUMANN-EULER EXPANSIONS FOR THE MOORE-PENROSE INVERSE OF AN ARBITRARY MATRIX,
by A. Ben-Israel and A. Charnes. 20 June 61, rev. 7 Aug 61, 9p.
(Contract Nonr-122810, Proj. NR 047-021)
(ONR Research memo. no. 40) Unclassified report

DESCRIPTORS: (Numerical analysis, *Functional analysis, *Series, Algebra, *Matrix algebra, Integral equations.) (Geodetic data, *Linear programming.)

A mathematical study is made of the theory and application of generalized inversions of an arbitrary rectangular matrix through the use of Neumann-Euler expansions for the Moore-Penrose inverse of an arbitrary matrix. Projection properties based upon the classical theorems such as the Fredholm alternative, and matrix series identities of Moebius type, are developed.

AD-264 036 Div. 15
(TIPSP/JDP) OTS price $1.60

Princeton U., N. J.
A DEFINITION OF SUBJECTIVE PROBABILITY,
by F. J. Anscombe and R. J. Aumann. 16 Aug 61, 11p. 13 refs. (Research memo. no. 30)
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: (*Probability, Games theory, Mathematical logic.)

Personal or subjective concept of probability is considered. Probabilities and utilities are defined in terms of a person's preferences, in so far as these preferences satisfy certain consistency assumptions. The person's probabilities are defined in terms of chances, by an extension of the von Neumann-Morgenstern theory (Princeton Univ. Press 2nd ed.; Chap. 3 and Appendix, 1947). (Author)

AD-264 037 Div. 15
(TIPSP/MFA) OTS price $3.60

Purdue Research Foundation, Lafayette, Ind.
QUASI ADDITIVE SET FUNCTIONS AND THE CONCEPT OF INTEGRAL OVER A VARIETY.
Technical note no. 16 on Analytical Theory of Continuous Transformations,
by Lamberto Cesari. Apr 59, 32p.
(Contract AF 18(600)1484, Proj. 17501)
(AFOSR TN 59-478) Unclassified report

DESCRIPTORS: (*Functional analysis, Topology, Algebras.) (Theory, Functions, Measure theory, *Integrals, Integration.) (Transformations (Mathematics), Complex variables, *Calculus of variations.)

A topological treatment of quasi additive set functions is presented and the application of surface area theory is made through the use of the calculus of variations by various authors. Theorems, proofs, and examples of several integrals are given.

AD-264 051 Div. 15
(TIPSP/MFA) OTS price $1.10

Rutgers U., New Brunswick, N. J.
TAIL AREAS OF THE T-DISTRIBUTION FROM A MILL'S-RATIO-LIKE EXPANSION,
by R. S. Pinkham and M. B. Wilk. Sep 61, 5p. incl. table (Technical rept. no. N-9)
(Contract Nonr-40416)
Unclassified report

DESCRIPTORS: (*Statistical analysis, Numerical methods and procedures, *Statistical distributions, Probability.) Tables.

A Monte Carlo study is made of the percentage points for the t-distribution from an asymptotic expansion of Mill's ratio for the normal. Numerical results are presented in a table.

AD-264 052 Div. 15
(TIPSP/MFA) OTS price $1.60

Miami U., Coral Gables, Fla.
POLYNOMIAL INTERPOLATION IN POINTS EQUIDISTRIBUTED ON THE UNIT CIRCLE,
by J. H. Curtiss. 25 July 61, 19p. 16 refs.
(Contract AF 49(638)862)
(AFOSR TN 60-1424) Unclassified report

DESCRIPTORS: (Numerical analysis of *Curve fitting by *Polynomials, Probability.) (*Algebraic topology, Equations, Difference equations, Complex variables, Taylor's series.)

Let $L_n(f; z)$ be the polynomial of degree at most n-1 found by interpolation in the distinct points $z_{nk} = e^{i\Theta_{nk}}$, $k = 1, \ldots, n$, to a function f given on $|z| = 1$. It is known that a necessary and sufficient condition that $\lim_{n\to\infty} L_n(f; z) = f(z)$, $|z| \leq 1$, for all f analytic on $|z| \leq 1$, is that $\{\Theta_{nk}\}$ be equidistributed on $[0, 2\pi]$. In nonanalytic cases, convergence has been established when z_{nk} is an n-th root of unity, but the behavior of $\{L_n\}$ with other spacings of the interpolation points is not clear. It is here proved that if Θ_{nk}, $k = 1, \ldots, n$, are independent random variables each with a uniform probability distribution and if f satisfies certain mild smoothness restrictions on $|z| = 1$, then

$$E[L_n(f; z)] = (1/2\pi i) \int_{|t|=1} [f(t)/(t - z)][1 - (z^n/t^n)]\, dt,$$

where L_n is found by interpolation to f in the random points $z_{nk} = e^{i\Theta_{nk}}$. A simple example is constructed involving an equidistributed sample sequence $\{\Theta_{nk}\}$ for which $L_n(f; z)$ diverges to infinity at each point z, $|z| < 1$, for at least one function f continuous on $|z| = 1$. (Author)

AD-264 054 Div. 15, 12, 22
(TIPSP/MFA) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE EVALUATION OF SOME QUALITY INDICES BY MEANS OF LYAPUNOV FUNCTIONS,
by Paul Constantinescu, tr. by Naum S. Bers.

May 61, 19p. incl. illus. tables (Rept. no. STL-TR-61-5110-22, Trans. from Automatica Si Electronica, 2:139-144, 1958).
Unclassified report

DESCRIPTORS: (*Control systems, Nonlinear systems, *Quality control.) (*Functions, Differential equations, Integral equations, Matrix algebra.) (Translations, Rumania, Technological intelligence.)

A statement and proof of a theorem concerning the asymptotic stability in the large of the trivial solution of $\dot{\vec{x}} = \vec{f}(\vec{x}, t)$ is presented. Two quality or performance indices, maximum overshoot and settling time are evaluated by using the theorem in conjunction with Lyapunov functions. The results are then applied by way of illustrative examples to two nonlinear control systems of second and third order respectively. The paper concludes with a discussion of ways in which the evaluation of the performance index could be improved, for instance, by using different Lyapunov functions. (Author)

AD-264 057 Div. 15, 12, 22
(TIPSP/MFA) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
APPLICATION OF THE LIAPUNOV-POINCARE METHOD TO THE INVESTIGATION OF AUTOMATIC CONTROL SYSTEMS WITH DELAY,
by U. A. Ryabov, tr. by Z. Jakubski. Jan 61, 23p. incl. illus. (Rept. no. STL-TR 61-5110-1, Trans. from Akademia Nauk SSSR. Avtomatika i Telemekhanika, Vol. 21, no. 6, 1960)
Unclassified report

DESCRIPTORS: (Automatic *Control systems of Statistical process by Functions.) (Theory, Perturbation theory, *Differential equations, Polynomials, Taylor's series.) (Translations, USSR, Technological intelligence.)

The investigation of automatic control delay systems based on using the delay as a small parameter and on application of the method of Liapunov-Poincare is proposed. The automatic control system considered is described by linear equations with constant coefficients and one constant delay. (Author)

AD-264 058 Div. 15
(TIPSP/JDP) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
AN INVESTIGATION OF ONE NONLINEAR SYSTEM OF THREE DIFFERENTIAL EQUATIONS,
by V. A. Pliss, tr. by K. N. Trirogoff. May 61, 9p. incl. illus. (Rept. no. STL-TR 61-5110-19, Trans. from Doklady Akademii Nauk SSSR, Vol. 117, no. 2, 1957)
Unclassified report

DESCRIPTORS: (*Nonlinear differential equations, *Differential equations, Functions, Integrals, Nonlinear systems.) (Translations, USSR.)

Statements (without proof) are given for two lemmas and twelve theorems yielding constraints on system parameters and nonlinearity for asymptotic stability in the large and boundedness of solutions of a system of the following three Aizerman-type equations: $dx = y - f(x)$, $dy = z - x$, and $dz = ax - bf(x)$. A method is also advanced for constructing a Lyapunov function for Aizerman-type systems; these Lyapunov functions are of the form: integral of the nonlinearity plus a quadratic form in the state variables. Two of the twelve theorems yield sufficient conditions for the existence of periodic solutions of the above system; much of the discussion evolves about when satisfaction of the generalized Routh-Hurwitz implies stability in the large for the null solution. No examples or indication towards practical application of the theorems is given. (Author)

AD-264 059 Div. 15, 26
(TIPSP/TL) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
A STATISTICAL PROBLEM OF OPTIMAL CONTROL,
by E. F. Mishchenko and L. S. Pontryagin, tr. by Lucien W. Neustadt. Jan 61, 6p. incl. illus. (Rept. no. STL-TR 61-5110-34, Trans. from Doklady Akad. Nauk SSSR, 128:890-892, 1959)
Unclassified report

DESCRIPTORS: (*Scheduling, *Control systems, *Orbital flight paths, Ellipsoids.) (*Differential equations, Partial differential equations, *Probability, Matrix algebra, Green's function.) (Spheres, Motion.)

AD-264 067 Div. 15, 12, 30
(TIPSP/MFA) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
ON A PROBLEM IN THE STABILITY THEORY OF AUTOMATIC REGULATING SYSTEMS,
by I. G. Malkin, tr. by R. E. Mortensen. July 61, 9p. incl. illus. (Rept. no. STL-TR 61-5110-39, Trans. from Institut Mekhaniki Akademii Nauk SSSR, Vol. 16, 1952)
Unclassified report

DESCRIPTORS: (*Control systems, *Linear systems.) Functions, Theory, Differential equations, Integral equations, Perturbation theory.

The problem proposed by Aizerman (Uspekhi Matematicheskikh Nauk., 1949, Vol. 4) in regard to the stability of a set of non-linear differential equations is presented. Conditions for stability are hypothesized by making a linear analogy to the original non-linear system. The validity of these conditions is tested for second-order systems only, by means of Lyapunov methods. The conclusion is that the answer to the Aizerman conjecture is always affirmative for second order systems. A general proof is given for the second order case, but no illustrative numerical examples are supplied. (Author)

AD-264 069 Div. 15
(TIPSP/JDP) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
ON ONE CLASS OF NONLINEAR DIFFERENTIAL EQUATIONS,
by V. A. Yakubovich, tr. by K. N. Trirogoff. May 61, 8p. incl. illus. (Rept. no. STL-TR 61-5110-18, trans. from Doklady Akademii Nauk SSSR, Vol. 117, no. 1, 1957)
Unclassified report

DESCRIPTORS: (*Non-linear differential equations, Theory, Matrix algebra, Vector analysis, Numbers, Special functions.) (Translations, USSR.)

Lur'es method for determining the stability in the large of solutions of nonlinear differential equations in invariance form is presented. The question of stability is considered in the large of the null solution, x equals S equals 0, of the following system of differential equations, (1) dx equals Ax plus aR(S), for S R(S), for S R(S) greater than zero; and (2) dS equals (b,x)- P R(S), for R(0) equal to 0, by employing a Lyapunov function of the form V equals (Hx,x) plus the integral R(u) du, where H* equals H and u varies from 0 to S. Three theorems are stated which give the sufficient conditions for the null solution to be stable in the large; one of the theorems states necessary and sufficient conditions.

AD-264 147 Div. 15, 30
(TIPSP/MFA) OTS price $7.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE THEORY OF OPTIMAL PROCESSES. I. THE MAXIMUM PRINCIPLE,
by V. G. Boltyanskii, R. V. Gamkrelidze and L. S. Pontryagin, tr. by Lucien W. Neustadt.
Oct 60, 71p. incl. illus. (Rept. no. STL-TR 61-5110-36, Trans. from Izvestia Akad. Nauk SSSR, Ser. Mat., 24:3-42, 1960)
Unclassified report

DESCRIPTORS: (*Topology of *Linear systems.) (Functions, Pertubation theory, Numerical analysis, Differential equations, Partial differential equations, Integrals, Complex variables.) (Translations, USSR.) Mathematics.

The theory of the process of controlling some technical object is discussed. The conditions are expounded in the form of a maximum principle. It is assumed that the factors which control the motion of the object can be written in the form of differential equations which are presented. The system described is considered to be autonomous, i.e., its right-hand side is independent of the time, t.

AD-264 150 Div. 15, 12
(TIPSP/MFA) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE EXISTENCE OF LYAPUNOV FUNCTIONS IN THE CASE OF ASYMPTOTIC STABILITY IN THE LARGE,
by E. A. Barbashin and N. N. Krasovskii, tr. by K. N. Trirogoff. May 61, 12p. incl. illus. (Rept. no. STL-TR 61-5110-20, Trans. from Prikladnaya Matematika I Mekhanika, Vol. 18, 1954)
Unclassified report

DESCRIPTORS: (Satellite vehicle trajectories, *Flight paths of *Spheres, *Stability, Motion.) (Functions, Perturbation theory, Differential equations, Partial differential equations.) (Translations, USSR.)

Definitions on stability are given among which is included a detailed definition of stability in the large of two systems with time delay. Two theorems are stated with detailed proofs for solution of these systems. From the proof of theorem two, the question of the stability of a system of equations with respect to time delays is similar to the problem of the stability of motion for continuously operative disturbances.

AD-264 153 Div. 15, 1
(TIPSP/TL) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE STABILITY OF CONTROL SYSTEMS WITH TWO CONTROLLERS,
by A. N. Duvakin and A. M. Letov, tr. by K. N. Trirogoff. May 61, 12p. incl. illus. (Rept. no. STL-TR 61-5110-17, Trans. from Prikladnaya Matematika I Mekhanika, Vol. 18, 1954)
Unclassified report

DESCRIPTORS: (*Control systems, Linear systems, *Differential equations, Perturbation theory, *Functions, Inequalities.) (Stability, Theory, Time, Motion.)

An analysis is presented on the control system described by a differential equation. The problem is to determine the sufficient conditions for the asymptotic stability of the trivial solution of the control system for any finite initial perturbations. Details are given on the construction of the Lyapunov function. Results are used to determine the sufficient conditions for the stability of the trivial solution of an n + 2 order system whose characteristic equation of the first approximation has a zero root of multiplicity two. An example is given which considers a control system with two controllers. (Author)

AD-264 162 Div. 15, 30
(TIPSP/MFA) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
ON LYAPUNOV'S SECOND METHOD,
by S. K. Persidskii, tr. by Arthur R. Kraiman.
May 61, 14p. incl. illus. (Rept. no. STL-TR 61-5110-31, Trans. from Prikladnaia Matematika i Mekhanika Otdelnie Tekhnicheskikh Nauk Akademii Nauk SSSR, 25:17-23, 1961).
Unclassified report

DESCRIPTONS: (*Mathematical analysis, Series, *Statistical tests.) (Functions, Equations, *Differential equations.) USSR.

Definitions of a weakly positive-definite scalar function and a strongly positive-definite scalar function of state variables of a system of nonlinear differential equations are presented. A statement and detailed proof of each of two theorems in conjunction with the aforementioned definitions are given. (Author)

AD-264 165 Div. 15
(TIPSP/JDP) OTS price $7.60

Space Technology Labs., Inc., Los Angeles, Calif.
OPTIMAL PROCESSES WITH BOUNDED PHASE COORDINATES,
by R. V. Gamkrelidze, tr. by Lucien W. Neustadt.
Mar 61, 74p. incl. illus. 10 refs. (Rept. no. STL-T-61-5110-35, Trans from Izvestia Akad. Nauk SSSR, Ser. Mat., 24:315-356, 1960)
Unclassified report

DESCRIPTORS: (Linear systems, *Calculus of variations, Algebraic topology, Functions, Vector analysis.) (Translations, USSR, Technological intelligence, Mathematics.)

Optimal control processes with bounded phase coordinates are studied, and an extremal equation for the corresponding variational problem is derived. (Author)

AD-264 170 Div. 15, 5
(TIPSP/MFA) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
OPTIMAL PROCESSES IN AUTOMATIC PULSE SYSTEMS,
by Ya. Z. Tsypkin, tr. by Z. Jakubski. Mar 61, 8p. incl. illus. (Rept. no. STL-TR 61-5110-12, Trans. from Doklady Akademii Nauk SSSR, Tom 134, no. 2, 1960)
Unclassified report

DESCRIPTORS: (*Satellite vehicle trajectories, Linear systems, *Linear programming.) (*Numerical analysis, Theory, Functions, Equations, Complex variables, Partial differential equations, *Difference equations.) (Translations, USSR.)

Automatic pulse systems are described by difference equations. The solution of earlier optimal process problems was reduced to the detection of a trajectory connecting the origin of the coordinates with a point corresponding to initial conditions. This approach is based on the application of a convolution equation instead of a system of difference equations of the first order. This makes it possible to solve an optimal process problem on the basis of an elementary system of the extremum theory of multiple variable functions.

AD-264 173 Div. 15, 12, 30
(TIPSP/MFA) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
ON A PROBLEM CONCERNING THE STABILITY ''IN THE LARGE'' OF DYNAMIC SYSTEMS,
by M. A. Aizerman, tr. by R. E. Mortensen. May 61, 6p. incl. illus. (Rept. no. STL-TR 61-5110-32, Trans. from Uspekhi Mat. Nauk, 4:187-188, 1949)
Unclassified report

DESCRIPTORS: (*Nonlinear systems, Control systems, Automatic, *Stability, Deflections.) (Functions, Equations, *Differential equations, Linear systems.) (Translations, *USSR.)

A problem is proposed about the stability of a set of differential equations which has significance to the theory of automatic control systems. An assertion is made, based on a linear analogy to a nonlinear system. (Author)

AD-264 174 Div. 15
(TIPSP/MFA) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE STABILITY OF THE SOLUTION OF A NONLINEAR EQUATION OF THE THIRD ORDER,
by S. N. Shimanov, tr. by K. N. Trirogoff. Mar 61, 10p. incl. illus. (Rept. no. STL-TR 61-5110-2. Trans. from Akad. Nauk SSSR, Prikl. Mat. I Mekhan, Vol. 17, 1953)
Unclassified report

DESCRIPTORS: (*Satellite vehicle trajectories, *Non-linear differential equations.) (Functions, Statistical tests, *Perturbation theory.) (Translations, *USSR.) Nonlinear systems.

AD-264 177 Div. 15, 25
(TIPSP/MFA) OTS price $5.60

Sloane Physics Lab., Yale U., New Haven, Conn.
IRREDUCIBLE REPRESENTATIONS OF MAGNETIC GROUPS,
by J. O. Dimmock and R. G. Wheeler. 19 July 61, 49p. incl. illus. tables, 32 refs.
(Contract AF 49(638)503)
(AFOSR-2313) Unclassified report

DESCRIPTORS: (*Groups (Mathematics) and Solid state physics of Crystal structure and *Magnetic properties for Ferromagnetic materials in Linear systems and Nonlinear systems.) (Theory, Functions, Equations, Operators (Mathematics).) Tables.

The general considerations of Wigner (Group Theory, translated from the German by J. J. Griffin, Academic Press, 1959, chapter 26) concerning the irreducible representations of groups containing both linear and anti-linear unitary operators are used to obtain a criterion by which the representations of such groups may be obtained. The result found by Herring for space groups (Phys. Rev. 52:361, 1937) is derived and the properties of the 58 magnetic point groups are determined. (Author)

AD-264 272 Div. 15, 30
(TIPSP/MFA) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
SINGULAR PERTURBATIONS OF ORDINARY DIFFERENTIAL EQUATIONS.
by Bernard Friedman. Aug 61, 44p. incl. illus. (Rept. no. D1-82-0132; Mathematical note no. 245)
(In cooperation with California U., Berkeley)
Unclassified report

Summary of six lectures on 'Singular Perturbations of Ordinary Differential Equations' given by Professor Bernard Friedman at the Boeing Scientific Research Labs. in Aug 61.

Also available from author.

DESCRIPTORS: (*Perturbation theory of Differential equations.) (*Series, Integral equations, Partial differential equations.)

A discussion is presented concerning the perturbation method for ordinary differential equations with a small parameter epsilon. As illustrations of this procedure, use of the Neumann series and the Fredholm expansion is made. The solution of the eigenvalue problem is made for an ordinary differential equation as a power series in epsilon.

AD-264 275 Div. 15, 12, 1, 30
(TIPSP/MFA) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
APPLICATION OF GREEN'S THEOREM TO THE EXTREMIZATION OF LINEAR INTEGRALS,
by Angelo Miele. June 61, 42p. illus. (Rept. no. D1-82-0112; FSL Rept. no. 40)
Unclassified report

Paper presented at the IAS Symposium on Vehicle Systems Optimization, Garden City, N. Y., Nov 28-29, 1961.

Also available from the author.

Division 15 - MATHEMATICS

DESCRIPTORS: (*Aerodynamics, Turbojet engines, Turbofan engines, Turbo-ramjets, Rockets, Rocket flight, Air to air, Guided missiles, Surface to surface.) (Equations, Functions, *Integrals, Transformations (Mathematics), *Green's function, Complex variables.) *Applied mathematics.

The general theory for the application of Green's Theorem relative to the transformation of line integrals into surface integrals is made. The application is concerned with both the simple type and the isoperimetric type. The theory is illustrated with purely mathematical examples and engineering applications to the optimum burning program for a short-range air-to-air missile and the optimum drag modulation program for a variable-geometry light ballistic missile reentering through an arbitrary atmosphere.

AD-264 277 Div. 15, 22, 30
(TIPSP/MFA) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN EXTENDED TABULATION OF MODIFIED DISCRETE ORTHOGONAL FUNCTIONS,
by Keats A. Pullen and George C. Francis. Aug 61. 43p. incl. tables (BRL Memorandum rept. no. 1363)
(Army Proj. 503-06-011)
Unclassified report

DESCRIPTORS: (*Mathematical logic, *Tables, Functions, Series, *Polynomials, Fourier analysis, Differential equations, Integration.)

A tabulation of discrete orthogonal functions in a form minimizing the effort required for their application is presented along with a discussion of their use and a compilation of many of the relations which can prove useful as aids to computation. (Author)

AD-264 290 Div. 15
(TIPSP/TL) OTS price $8.10

Douglas Aircraft Co., Inc., El Segundo, Calif.
EXTENSIONS OF THE FALKNER - SKAN SIMILAR SOLUTIONS OF THE BOUNDARY LAYER EQUATIONS TO FLOWS WITH SURFACE CURVATURE,
by J. S. Murphy. 15 Aug 61, 87p. incl. illus. tables (Rept. no. ES-40487)
Unclassified report

DESCRIPTORS: (*Boundary layer, *Laminar boundary layer, *Numerical methods and procedures, *Partial differential equations, *Differential equations, Integration, Digital computers.) (Fluid flow, *Surfaces, *Wedges.) (Pressure, Velocity, Theory, Analysis, Friction.) (Errors, Tables.)

Results of a study of the effects of longitudinal surface curvature on incompressible laminar boundary layer flows are presented. They were obtained by numerical solution of a generalized Falkner-Skan equation governing similar solutions for flows over curved surfaces. The curvature parameter is essentially the inverse square root of the Reynolds number based on free stream conditions and a characteristic radius of curvature. The results indicate that, for equal flow conditions, boundary layer thickness is greater for flows with convex surface curvature than for those with concave curvature. An important influence of curvature on the velocity profile occurs near the outer edge of the boundary layer where, due to the pressure gradient normal to the surface, the gradient of the velocity component parallel to the surface, in a direction normal to the surface, is negative for convex and positive for concave surfaces in contrast to its value of zero for flows where the curvature correction is neglected. (Author)

AD-264 334 Div. 15
(TIPSP/JDP) OTS price $1.10

Illinois U., Urbana.
ON A THEOREM OF ERDOS AND FUCHS IN ADDITIVE NUMBER THEORY.
Technical rept.,
by P. T. Bateman, E. E. Kohlbecker, and J. P. Tull. 1961, 6p.
(Contract Nonr-183418, Proj. NR 043-194)
Unclassified report

DESCRIPTORS: (*Number theory, Functions.)

The results of Erdos and Fuchs on additive number theory (J. Math Soc London 31: 67-73, 1956) are generalized to include the main terms of the form xL(x), with L a special type of slowly oscillating functions.

AD-264 335 Div. 15
(TIPSP/JDP) OTS price $2.60

Illinois U., Urbana.
THE RING GENERATED BY THE q-th POWERS OF THE INTEGERS OF AN ALGEBRRAIC NUMBER FIELD, q BEING A PRIME,
by Paul T. Bateman and Rosemarie S. Stemmler. 1961, 19p. incl. table, 15 refs.
(Contract Nonr-183418, Proj. NR 043-194)
Unclassified report

DESCRIPTORS: (Algebra, *Number theory.)

The following Theorem is proved: Let K be an algebraic number field of finite degree n over the rationals and let J (K) be its ring of integers. Let J sub q (K) be the additive group generated by the qth powers of the elements of J (K). Suppose q is a prime number, then J sub q (K) is equal to J (K), if and only if neither of the following circumstances obtains in K: (1) q is ramified in K, or (2) q is expressible in the form (p to the r power -1)/ (p to the d power -1), where p is a prime, r and d are positive integers, and p has in J (K) a prime ideal factor of degree r.

AD-264 391 Div. 15, 8, 30
(TIPSP/MFA) OTS price $2.60

Electronics Research Lab., Northeastern U., Boston, Mass.
TRANSFORM METHODS FOR NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS,
by Ralph E. Bach, Jr. 15 Sep 61, 25p. incl. illus. tables (Scientific rept. no. 5)
(Contract AF 19(604)4573)
(AFCRL-755) Unclassified report

DESCRIPTORS: (Mathematical logic of Linear systems, *Differential equations, Difference equations, Taylor's series, Integrals, Transformations (Mathematics), *Integral transforms.) (*Numerical analysis by Electronic equipment, Digital computers, Programming, Data.) Tables.

The use of transform calculus (Laplace and z-transforms) for obtaining numerical solutions of ordinary differential equations is discussed. Comparisons are made with well-established techniques used in numerical analysis and conclusions are drawn with respect to applicability, accuracy and conceptual simplicity. (Author)

AD-264 399 Div. 15
(TIPSP/JDP) OTS price $3.60

Pennsylvania U., Philadelphia.
A THEOREM ON THE ACTION OF SO(3).
Interim technical rept. no. 4 on Transformation Groups on Homological Manifolds,
by Chung-Tao Yang. 1961, 33p.
(Contract DA 36-034-ORD-2970, Proj. TB 2-0001)
(AROD rept. no. 2056:7) Unclassified report

DESCRIPTORS: (*Algebraic topology, Groups (Mathematics), Transformations (Mathematics), Theory.)

A proof is presented of the following theroem: Let X be a compact cohomology n-manifold over Z, the ring of integers, with H*(X;Z) equal to H*(S(n);Z) and let G equal SO(3), the rotational of the euclidean 3-space, act on X with B equal to (n-2), where B is the union of all singular orbits of dimension Z. Then D does not equal zero and one of the following occurs: (1) n equals one and G acts trivially on X; (2) n is greater than or equal to 4 and for every Y belonging to D,G(Y) is a dihedral group of order 4 (Y is an element of X); or (3) n is greater than or equal to 5, and for every Y belonging to U, G(Y) is the identity group.

AD-264 426 Div. 15
(TIPSP/TL) OTS price $1.10

William Marsh Rice U., Houston, Tex.
REGULARIZED SET OPERATIONS,
by A. Brown. 30 June 61, 9p.
(Contract AF 49(638)632)
(AFOSR-1010) Unclassified report

DESCRIPTORS: (*Algebraic topology, Polynomials, *Algebra, Algebras.)

The validity of general Boolean identities is investigated for certain set operations in a topological space that are obtained by systematically modifying (regularizing) the usual basic set operations. (Author)

AD-264 427 Div. 15
(TIPSP/JDP) OTS price $1.10

William Marsh Rice U., Houston, Tex.
THE DETERMINATION OF COEFFICIENTS IN PARABOLIC DIFFERENTIAL EQUATIONS BY MEASUREMENTS IN THE INTERIOR OF THE MEDIUM,
by B. Frank Jones, Jr. July 61, 7p.
(Contract AF 49(638)632)
(AFOSR-1153) Unclassified report

DESCRIPTORS: (*Partial differential equations, Theory, Integral equations.)

Unknown coefficients in a parabolic differential equation are determined by giving additional information about the solution of the differential equation. Consider the heat equation, du/dt equals a(t)(d(du/dx)), in either a bounded medium with zero boundary values or in an infinite rod. Here both a(t) and u(x,t) are unknown. If certain initial values for u(x,t) are prescribed and if u(x,t) is measured for all t and for some fixed initial x, then there is exactly one pair a(t) and u(x,t) satisfying the differential equation together with the boundary and initial conditions, and such that u(x,t) takes required values at fixed initial x.

AD-264 428 Div. 15
(TIPSP/JDP) OTS price $1.10

William Marsh Rice U., Houston, Tex.
AN EXPLICIT FORMULA FOR AN UNKNOWN COEFFICIENT IN A PARABOLIC DIFFERENTIAL EQUATION,
by B. Frank Jones, Jr. July 61, 4p.
(Contract AF 49(638)632)
(AFOSR-1154) Unclassified report

DESCRIPTORS: (*Partial differential equations, Differential equations, Theory, Integral equations.)

Let the heat equation (du/dt) equals a(t)(d(du/dx)), be satisfied in a semi-infinite medium (x positive), where both a(t) and u(x,t) are unknown. If u(x,o) equals o, u(o,t) equals f(t) (where f is constant), and -a(t)(du/dt)(o,t) equals g(t), then under certain conditions on g(t), there is exactly one pair a(t), u(x,t) satisfying the differential equation and the boundary and initial conditions. Also, an explicit formula gives a(t) in terms of g(v), for v less than or equal to t.

AD-264 429 Div. 15
(TIPSP/JDP) OTS price $1.10

William Marsh Rice U., Houston, Tex.
FURTHER RESULTS ON AN UNKNOWN COEFFICIENT IN A PARABOLIC DIFFERENTIAL EQUATION,
by B. Frank Jones, Jr. July 61, 9p.
(Contract AF 49(638)632)
(AFOSR-1155) Unclassified report

DESCRIPTORS: (*Partial differential equations, Theory, Integral equations, Operators (Mathematics).)

An unknown coefficient in a parabolic differential equation is investigated by overspecifying the boundary behavior of the system. The parabolic equation du/dt equals a(t)(d(du/dt)), for x between 0 and 1 and for t positive, is studied where both a(k) and u(x,t) are unknown. If initial and boundary values for x(u,t) are specified and if -a(t)(du/dt)(0,t) is specified, then under certain hypotheses there is exactly one pair a(t),u(x,t) satisfying the differential equation and the initial and boundary conditions.

AD-264 487 Div. 15, 30
(TIPSP/MFA) OTS price $1.10

Washington U., Seattle.
LATTICE THEORY RESEARCH.
Final rept.,
by Peter L. Crawley. 31 Aug 61, 1p.
(Contract Nonr-47731, Proj. NR 043-244)
Unclassified report

DESCRIPTORS: (*Lattices, Exchange reactions, *Decomposition.) Groups (Mathematics), Theory, Series.

An extension is made of the Dilworth and Crawley theory of meet decompositions for compactly generated atomic lattices of a semimodular type. This research was extended to include the non-semimodular case. A consequence of these results is the proposal of the following group theorem: if an operator group G is a direct product of groups each having a principal series, then any two direct decompositions of G have centrally isomorphic refinements.

AD-264 525 Div. 15
(TIPSP/WH) OTS price $12.00

Washington U., Seattle.
MATRIX ALGEBRA FOR SOCIAL SCIENTISTS, PART I.,
by Paul Horst. Aug 61, 159p. incl. illus. tables.
(Contract Nonr-47708)
Unclassified report

DESCRIPTORS: (*Matrix algebra, Mathematical prediction, *Behavior, Statistical analysis.)

An extensive treatment on notation, terminology, concepts and computational procedures which have been found useful in the application of matrix algebra to multivariate experimental designs in the social and biological sciences. The presentation is directed to those with no more than a moderately good working knowledge of high school freshman algebra and introductory statistics. Traditional and rigorous mathematical treatment has not been striven for. Some of the material which has been found most useful in the formulation of experimental models and the analysis of data matrices is not readily available in the mathematical literature. (Author)

AD-264 543 Div. 15, 8, 12, 30
(TIPSP/MFA) OTS price $11.00

Purdue U. School of Electrical Engineering, Lafayette, Ind.
STABILITY OF NONLINEAR CONTROL SYSTEMS BY THE SECOND METHOD OF LIAPUNOV.
Final rept., vol. 2,
by J. E. Gibson, E. S. McVey and others. July 61, 137p. incl. illus. tables.
(Contract AF 29(600)1933, Proj. 6889)
(AFMTC TR 61-6) Unclassified report

DESCRIPTORS: (Mathematical analysis of Linear systems, *Control systems by *Differential equations.) (*Nonlinear systems, Functions, Theory, Integrals, Transformations (Mathematics), Complex variables.) (*Guided missile trajectories, Time, Time lag theory.) (Servomechanisms, Motion, Feedback.) Tables.

A report is made on the use of the second method of Liapunov as a tool for stability analysis of nonlinear control systems. A pole-shifting technique and a zero-shifting technique, extending the applicability of simplified stability criteria to systems that are stable for sufficiently high and/or sufficiently low values of loop gain, in a closed loop system, are proposed. New simplified stability criteria have been developed which incorporate the changes in the canonic form of differential equations caused by the application of the zero-shifting technique.

AD-264 556 Div. 15, 25, 30
(TIPSP/MFA) OTS price $2.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A STUDY OF THE NON-UNIFORM CONVERGENCE OF THE INVERSE OF A DOUBLY-INFINITE MATRIX ASSOCIATED WITH A BOUNDARY VALUE PROBLEM IN A WAVEGUIDE,
by R. Mittra. 1961, 21p. incl. table (Technical rept. no. 53)
(Contract AF 33(616)6079, Proj. 9-(13-6278))
Unclassified report

DESCRIPTORS: (Electromagnetic theory of *Wave transmission in *Waveguides.) (Theory, Equations, Matrix algebra.)

A doubly infinite set of equations is presented for application to the bifurcation problem in a waveguide. These equations have been obtained by Hurd and Gruenberg through the use of the calculus of residues. This set of equations is particularly suited to demonstrate by inverting several finite size matrices that there results a conditional convergence when P approaches infinite and Q approaches infinity. A theoretical basis for choosing the correct P/Q, when working with a truncated set is postulated.

AD-264 557 Div. 15, 25, 30
(TIPSP/MFA) OTS price $2.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ON THE SOLUTION OF A CLASS OF DUAL INTEGRAL EQUATIONS,
by R. Mittra. 1961, 13p. (Technical rept. no. 51)
(Contract AF 33(616)6079)
Unclassified report

DESCRIPTORS: (*Integral equations of Electromagnetic theory and *Diffraction through *Disks.) (Theory, Functions, Equations, Integral transforms.)

The solution of a class of dual integral equations which appear in the formulation of electristatic and electromagnetic boundary value problems possessing circular symmetry is discussed. Two classes of equations are discussed out of which the first one admits a closed form solution. A Fredholm's equation of the second kind is derived for the second class and iterative means of solution are suggested. Some particular advantages of the formulation are pointed out. (Author)

AD-264 605 Div. 15
(TIPSP/MFA) OTS price $3.60

RIAS, Inc., Baltimore, Md.
ASYMPTOTIC BEHAVIOR OF THE SOLUTIONS OF DIFFERENTIAL - DIFFERENCE EQUATIONS,
by Jack K. Hale. 1961, 33p. 17 refs. (Technical rept. no. 61-10)
(Contract AF 49(638)382)
(AFOSR 1370) Unclassified report

DESCRIPTORS: (*Perturbation theory of *Differential equations, *Difference equations, Integrals, Integral transforms).

The theory on perturbed differential-difference equations is given. The use of ordinary differential equations is necessary in the testing of perturbation functions by use of the Lyapunov

functional. The advantages in using this particular function are two-fold. First, the unperturbed equation may be either linear or nonlinear. Secondly, there is no need for an integral representation for the solutions.

AD-264 606 Div. 15
(TIPSP/MFA) OTS price $1.60

RIAS, Inc., Baltimore, Md.
ON THE GLOBAL STABILITY OF AN AUTONOMOUS SYSTEM ON THE PLANE,
by Czeslaw Olech. 1961, 16p. (Technical rept. no. 61-12)
(Contract AF 49(638)382)
(AFOSR 1130) Unclassified report

DESCRIPTORS: (*Numerical analysis, *Curve fitting, *Spheres, Linear systems.) (Functions, Equations, *Differential equations, Partia differential equations, Matrix algebra, Green's function.)

A discussion is presented on global asymptotic stability in the large for systems of ordinary differential equations. Problems and proofs are given.

AD-264 647 Div. 15, 25
(TIPSP/WH) OTS price $1.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
ON HELMHOLTZ'S THEOREM AND THE COMPLETENESS OF THE PAPKOVICH-NEUBER STRESS FUNCTIONS FOR INFINITE DOMAINS,
by M. E. Gurtin. Aug 61, 15p. (Technical rept. no. 13)
(Contract Nonr-56225, Proj. NR 064-431)
Unclassified report

DESCRIPTORS: (*Stresses, Materials, Solids, Elasticity, Deformation, Theory.) (Mechanical properties, *Applied mathematics, Vector analysis, Tensor analysis, Operators (Mathematics).)

Displacement equations of equilibrium in linear theory of homogeneous and isotropic elastic solids are discussed. Use is made of Helmholtz's theorem which is of interest in mathematical physics as applied to elastostatics. The Papkovich-Neuber solution of stress functions for infinite domains is applied.

AD-264 678 Div. 15, 8
(TIPSP/TL) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
A SIMPLIFIED STABILITY CRITERION FOR LINEAR DISCRETE SYSTEMS,
by E. I. Jury. 14 June 61, 36p. incl. illus.
(Series no. 60, Issue no. 373)
(Contract AF 18(600)1521)
(AFOSR 1170) Unclassified report

DESCRIPTORS: (Scheduling, Data, Sampling, *Control systems, Simulation, Programming, Feedback.) (*Linear systems, Design, Theory, *Stability, Tests.) (Polynomials, Transformations, *Difference equations, Differential equations, Complex variables, Matrix algebra.)

A simplified analytic test of stability of linear discrete systems is obtained. This test also yields the necessary and sufficient conditions for a real polynomial in the variable z to have all its roots inside the unit circle in the z-plane. It is shown that for the test of a fourth-order system only a third order determinant is required and for the fifth-order only two determinants are required. The test is applied directly in the z-plane and yields the minimum number of constraint terms. Stability constraints up to the fifth-order case are obtained and for the nth order case are formulated. (Author)

AD-264 680 Div. 15
(TIPSP/TL) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
(No Title).
Final technical rept., 15 July-30 Sep 61,
by E. I. Jury. 30 Sep 61, 18p. incl. illus.
(Series no. 60, Issue no. 401)
(Contract AF 18(600)1521)
(AFOSR 1171) Unclassified report

DESCRIPTORS: (Scheduling, Data, *Sampling, Control systems, Automatic, Simulation, Programming.) (Design, Synthesis, Analysis, Theory.) (Difference equations, Statistical distributions, Differential equations, Numerical analysis, Information theory.) (Digital computers, Electrical network, Circuits, Electric filters, Feedback.)

The following experimental investigations, problems associated with simulation, programming and physical implementation of components and systems are discussed. A few pictures illustrating the physical setup of equipment and its purpose are presented. (Author)

16. MEDICAL SCIENCES

AD-264 064 Div. 16, 20
(TIPSB/LH) OTS price $5.60

Sloan-Kettering Inst. for Cancer Research, New York.
STUDY OF THE POST-IRRADIATION SYNDROME IN HUMANS.
Progress rept. no. 3, 1 Apr 54-31 Mar 55,
by James J. Nickson and Henry J. Koch, Jr.
31 Mar 55, 54p. incl. illus.
(Contract DA 49-007-md-533)
(AFSWP-743) Unclassified report

DESCRIPTORS: (Pathology, Physiology, *Radiation effects, X rays, Cancer, Man.) (*Radiation injuries, Analysis.)

Twelve persons have received total body irradiation. Radiation was done with the 1 Mev General Electric generator, HVL=3. 3mm Pb, and was delivered through four ports, upper and lower half of the body, anterior and posterior. The target skin distance in all cases was about 290 cm and

the dose rate was between 5 and 7 r/min. In general, coproporphyrin excretion, serum lipoprotein levels, and formed elements of the peripheral blood were measured. Patients receiving more than 50 r total body irradiation complained of weakness one to two hours following irradiation. This complaint persisted for the first twenty-four to thirty-six hours. Only three persons experienced any nausea and vomiting. Onset of nausea was within one hour following completion of radiation. Vomiting usually started two to three hours thereafter. Six patients developed severe thrombocytopenia. The maximum effect occurring about 28 days post-irradiation. Of these six patients, four developed hemorrhagic tendencies. It is important to note that the first three of these had subsequent radiation therapy to large ports between the time they received total body irradiation and the time they showed a thrombocytopenia. (Author)

AD-264 072 Div. 16, 5, 8
(TIPSB/CCH) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
REMOTE RECORDING BY RADIO OF THE RATE OF HEART CONTRACTIONS IN FREELY MOVING HUMAN SUBJECTS, (Registratsiya po Radio Chastoty Serdechnykh Sokrashchenii u Svobodno Peredvigayushchegosya Cheloveka),
by V. V. Rosenblat and L. S. Dombrovskii, tr. by Z. Jakubski. Aug 61, 15p. incl. illus. 39 refs. (Rept. no. STL-TR 61-5110-43, Trans. from Fiziologicheskii Zhurnal SSSR IM. I. M. Sechenova, pp. 718-724, 1955)
Unclassified report

DESCRIPTORS: (*Heart, *Recording systems, *Radio, Measurement, Motor reactions, Man, Electronics, *Electrodes, Experimental data, Analysis.) *Medical research, *Scientific research, USSR, Translations.

Research was undertaken to develop methods to observe various dynamic functions of a freely moving subject remaining in natural conditions of its activity; this will be of the utmost importance for the physiology of work and sport, for clinical and labor experts, for aviation medicine, for the physiology of farm animals, as well as for study of the physiological problems of astronautics. (Author)

AD-264 187 Div. 16
(TIPSB/LH) OTS price $1.10

Insect Control and Research, Inc., Baltimore, Md.
(No title).
Monthly rept. no. 9, 1-30 Sep 61,
by Eugene J. Gerberg. 3 Oct 61, 4p.
(Contract DA 18-064-cml-2750)
Unclassified report

DESCRIPTORS: (*Mosquitoes, Rearing, *Laboratory equipment, Air transportation, Packaging, Growth, Containers, Waxes, Coatings, Eggs, Production.)

Efforts were concentrated on process research concerning the effects of temperature, light and miscellaneous tray materials on the synchronization of larval development and adult longevity. Ten replications have been completed for the temperature and miscellaneous tray material phases, and the data are being compiled for analysis. (Author)

AD-264 326 Div. 16
(TIPSB/MS) OTS price $1.60

Karolinska Inst., Stockholm (Sweden).
ABRIDGED RESEARCH REPORT FOR 1958,
by D. Carlstrom. 1958, 29p. incl. illus.
(Contracts AF 61(052)21 and AF 61(052)15)
(AFOSR TN-59-340) Unclassified report

DESCRIPTORS: (*Medical research, *Tissues (Biology), Calcification, X-ray absorption analysis, Radiobiology.) (Biophysics, Skin, Diseases.) Scientific organizations, Sweden.

Contents:
Investigation of the ultrastructure of calcified tissues, quantitative aspects of the degree of mineralization and methodological improvements and applications, by D. Carlstrom
Theoretical and experimental studies of the X-ray absorption process in different tissues, by D. Lindstrom
Microradiographical and histological investigation of dental development anomaly, by Karl-Ake Omnell
Biophysical study of several dermatoses, by C. Swanbeck

AD-264 358 Div. 16
(TIPSB/LH) OTS price $1.60

Insect Control and Research, Inc., Baltimore, Md.
(No title).
Quarterly rept. no. 3, 1 July-30 Sep 61,
by Eugene J. Gerberg. 6 Oct 61, 12p.
(Contract DA 18-064-cml-2750)
Unclassified report

DESCRIPTORS: *Mosquitoes, Rearing, Growth, *Laboratory equipment, Containers, Food, Reproduction, Temperature, Life expectancy, Eggs.

Colonies are presently being maintained for both strains, with eggs being stockpiled at the rate of 300,000 to 500,000 per week. Considerable numbers of Psocids are still being encountered in our egg paper storage boxes. Attempts are being made to control these pests by fumigation methods, without damage to the eggs. A marked difference in larva development and pupa size has been observed with the use of yeast cake solution rather than dry brewers yeast. By raising the temperature of the water in the tray to about 81 F, plus the use of the yeast cake solution according to established rearing methods, about 50% pupation was obtained in most trays by the middle of day 6. (Author)

AD-264 393 Div. 16, 8
(TIPSB/JAB) OTS price $1.10

New York U. Coll. of Medicine, N. Y.
PHOTOCOAGULATION PRODUCED BY A COHERENT LIGHT SOURCE,
by Milton M. Zaret, Goodwin M. Breinin and others. 1961, 5p. incl. illus.
(Contract AF 30(602)2215)
(RADC TN 61-64) Unclassified report

DESCRIPTORS: (*Masers, *Light, Electromagnetic waves, Hazards, Eye, *Eye pigments, Injuries, Pathology.)

Abiotic effects of a pulsed beam of light produced by a LASER (light amplification by stimulated emission of radiation) device were investigated. Lasers or optical masers emit radio-

frequency electro-magnetic energy having microwave characteristics. The retina and iris of rabbits were exposed to single pulses and exhibited instantaneous thermal lesions after each exposure to the coherent light source. Potential hazards are considered in this preliminary report. (Author)

AD-264 395 Div. 16
(TIPSB/LH) OTS price $1.10

Mississippi U. School of Medicine, Jackson.
BASIC RESEARCH AND NEUROLOGIC ASPECTS OF HIGH BAROMETRIC PRESSURE PHENOMENA AND THE EFFECT OF ATMOSPHERIC CONTAMINANTS UPON CENTRAL NERVOUS SYSTEM ACTIVITY.
Final rept. 1 Aug 58-30 Sep 60,
by H. William Gillen. 1 Oct 61, 2p.
(Contract Nonr-268001, Proj. NR 102-489)
Unclassified report

DESCRIPTORS: (*Barometric pressure, Atmosphere, Contamination, Laboratory animals, *Metrazol, Carbon dioxide, Neurology, *Nervous system, Cerebral cortex, Physiology.)

AD-264 461 Div. 16
(TIPSB/LH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STAPES MOBILIZATION: EXPERIENCE IN THE UNITED STATES AIR FORCE,
by Ralph N. Kraus, Lois L. Elliott, and Edwin W. Moore. July 61, 11p. incl. illus. tables, 13 refs. (Rept. no. 61-88)
Unclassified report

DESCRIPTORS: (Physiology, *Ear, Hearing, Auditory acuity, Auditory perception, Diagnosis, *Surgery.)

This paper reviews results of 151 stapes mobilization operations on 94 patients. For patients on whom followup data were available, improvement in hearing seemed to be well maintained for a 6-month period. Although it was noted that operations performed on both ears of a patient tended to have similar results, the tendency was not statistically significant. Finally, there was considerable evidence that successful operations were proportionately higher in patients requiring surgery on only one ear. A further study is being conducted to obtain additional followup information for the entire sample. (Author)

AD-264 462 Div. 16
(TIPSB/CW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
AIR EVACUATION OF PATIENTS WITH HEAD INJURIES,
by David E. Langdon. Aug 61, 8p. incl. tables, 18 refs. (Report no. 61-91)
Unclassified report

DESCRIPTORS: (*Personnel with *Head injuries, Air transportation, Safety.)

Physicians from the School of Aerospace Medicine observed results of air evacuation by modern pressurized aircraft of 47 patients with varied head injuries. Problems related to flying were minimal. Motion sickness, manifested by vomiting, occurred in only 1 patient. Many patients were critically ill and required complex in-flight nursing care. In selection of patients for air evacuation, the hazards of transporting patients with pneumocephalus and pneumothorax must be considered. It may be necessary, also, to perform tracheotomy in preparing the comatose patient for flight. Pressurized aircraft have minimized the effects of changing ambient pressure on trapped air collections and the problems of hypoxia and motion sickness. For many patients studied in this series, air evacuation was a lifesaving measure which brought the neurosurgeon within a few hours of the general physician's doorstep. (Author)

AD-264 463 Div. 16
(TIPSB/CW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
DENTAL CARIES AND SYSTEMIC STATUS. PAROTID FLUID FLOW RATE, PAROTID FLUID, AND SERUM CHLORIDE AS RELATED TO DENTAL CARIES EXPERIENCE,
by Ira L. Shannon and Gerald M. Isbell. Aug 61, 5p. incl. illus. table, 20 refs. (Report no. 61-106)
Unclassified report

DESCRIPTORS: (*Chlorides in *Blood and *Saliva, Determination, Analysis, Physiology.) (*Dental caries, Etiology.)

Chloride determinations were carried out on blood serum and parotid fluid obtained at a very low flow rate from 527 apparently healthy young adult males classified as to dental caries experience (DMFS). There was no indication that parotid fluid flow rate or the chloride concentration of either of the fluids could be in any way related to dental caries experience. (Author)

AD-264 464 Div. 16
(TIPSB/LH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE VALSALVA MANEUVER: ITS RELATIONSHIP TO CHRONIC RECURRENT AEROTITIS MEDIA,
by William L. Watson. June 61, 8p. (Review 5-61)
Unclassified report

DESCRIPTORS: (Aviation medicine, Space medicine, *Aviation injuries, Aviation personnel, Pilots, *Ear, Pain, Pathology.) Hearing, Medical examination, Diagnosis.

The finding that 95 of the 100 experienced pilots--assumed to be free of chronic recurrent aerotitis media--performed the Valsalva maneuver successfully in both ears supports the proposition that ability to Valsalva is a desirable screening requirement. From these data it cannot be concluded that those unable to perform the Valsalva maneuver will develop recurrent, traumatic inflammation of the middle ear; how-

ever, there is rather striking evidence that subjects not suffering from this condition are able to perform the maneuver satisfactorily. (Author)

AD-264 465 Div. 16
(TIPSB/CW) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
HYPOTHERMIA IN THE MANAGEMENT OF BACTEREMIC SHOCK,
by Abraham T. K. Cockett and Willard E. Goodwin.
Aug 61, 16p. incl. illus. 45 refs. (Review 8-61)
(In cooperation with California U., Los Angeles School of Medicine)

Unclassified report

DESCRIPTORS: (*Bacteria in *Blood, Traumatic shock, Therapy by Hypothermia, Corticosteroids, Antibiotics.)

Fifteen urologic patients in whom bacteremic shock developed were studied. All had undergone a surgical procedure. Hypothermia was used as a therapeutic adjunct in 12 instances. Lowered body temperatures were maintained for 36 to 96 hours in the range of 88 to 97 degrees f. eleven of 12 patients treated in this way recovered. Three other patients died when managed in the conventional way without the use of hypothermia. Adrenal corticosteroids were prescribed in 12 of the 15 patients who were treated for bacteremic shock. Antibiotics and vasopressor substances were part of the therapeutic regimen in each case. (Author)

AD-264 657 Div. 16
(TIPSB/CW) OTS price $2.60

Air Force Missile Development Center, Holloman Air Force Base, N. Mex.
PHYSIOLOGICAL BASE-LINE STUDIES OF ZOOLOGICAL SPECIMENS. SERUM BIOCHEMICAL VALUES OF CHIMPANZEES,
by Fred W. Staten, Robert H. Edwards and others.
Aug 61, 15p. incl. tables, 33 refs. (Rept. no. AFMDC-TR-61-25)

Unclassified report

DESCRIPTORS: (*Primates, Laboratory animals, *Serum.) (*Blood, Analysis.)

Biochemical titres of various components in the sera of 52 chimpanzees are presented. The findings are compared with man and the Macaca mulatta monkey. The method employed for each specific analysis is briefly discussed. The concentrations of the factors in the serum of the chimpanzee herein reported are similar for the most part to those in human serum. (Author)

17. METALLURGY

AD-263 931 Div. 17, 22
(TIPSM/BRW) OTS price $3.60

Naval Weapons Plant, Washington, D. C.
EVALUATION OF AGE HARDENING COPPER BASE ALLOYS FOR EOD TOOLS,
by G. W. Trickett. 19 July 61, 33p. incl. illus. tables (Rept. no. NWPW-T-2-61)
(NAVORD rept. no. 6970)
Unclassified report

DESCRIPTORS: (*Ordnance disposal tools, *Copper alloys, Aluminum alloys, Nickel alloys, Silicon alloys, Zirconium alloys, Processing, Melting, Induction heating, Forging, Rolling mills, Heat treatment, Aging, Hardening, Deformation, Mechanical properties, Tensile properties, Hardness, Crystal structure, Microstructure.)

A series of age hardening Ni-Al-Si-Zr Cu-base alloys were investigated in the as cast and wrought conditions as possible substitutes or alternates for the Be-Cu alloys used in explosive ordnance disposal (EOD) tools. An evaluation of the mechanical properties and a study of the metallographic structures, as affected by variables involved in heat treating and mechanical working, are presented. Optimum minimum mechanical properties of 140,000 psi yield strength and 1% elongation were developed by: solution treating at temperatures from 1750 to 1950 F, water quenching, cold working to 65% R.A., and age hardening at temperatures of 750 to 850 F for 5 to 30 minutes. Salely on the basis of mechanical properties, these alloys could find acceptance not only for the EOD tools but also for leaf and coil spring applications up to 850 F. (Author)

AD-263 932 Div. 17
(TIPSM/BRW) OTS price $1.60

Northwestern U., Evanston, Ill.
EFFECT OF PRESTRAIN TEMPERATURE ON THE STRAIN AGING OF ALPHA-IRON,
by E. Lautenschlager and J. O. Brittain.
20 Sep 61, 15p. incl. illus. 10 refs.
(Contract AF 49(638)780; In cooperation with Allis-Chalmers Mfg. Co.)
(AFOSR-1467) Unclassified report

DESCRIPTORS: (*Iron, Crystals, Deformation, Aging, Low temperature research, Temperature, Tensile properties, Internal friction, Measurement.) Iron, Wire Theses, Stresses.

Yield point measurements were made on polycrystalline specimens of alpha-iron deformed various amounts at 77, 195 and 273 K; aged; and redeformed at 77, 195, and 273 K. When the prestrain temperature is lower than that subsequent to aging, the yield point return is suppressed relative to specimens deformed at the same temperature both before and after aging. The degree of suppression is a function of both the magnitude of prestrain at the lower temperature and the difference between the deformation temperatures before and after aging. It is proposed that the suppression is caused by the formation of dislocation barriers during the initial low temperature deformation. The aging kinetics of polycrystalline alpha-iron wires deformed at 77 or 303 K were studies at 44 and 64 C using internal friction measurements. No change was noted as a result of the difference in prestrain temperature. (Author)

AD-263 935 Div. 17, 25, 30
(TIPSM/BRW) OTS price $.50

Naval Research Lab., Washington, D. C.
AN OPTICAL TECHNIQUE FOR THE MEASUREMENT OF PLASTIC BENDING STRAINS AT ELEVATED TEMPERATURE,
by G. J. Danek, Jr., H. H. Smith, and M. R. Achter. 14 Aug 61, 6p. incl. illus. (NRL rept. no. 5661)
Unclassified report

DESCRIPTORS: (*Fatigue (Mechanics), Test methods, Test facilities, Test equipment, Optical instruments, Optical analysis, Strain gages, Deformation, Plasticity, High temperature research.) (*Sheets, Metals, Alloys, *Nickel, *Stainless steel, *Nickel alloys, Chromium alloys, Iron alloys, Fatigue (Mechanics), Stresses, Deformation, Controlled atmospheres, Measurement.)

In connection with a study of high-temperature fatigue properties in controlled environments, an optical method based on the determination of the radius of curvature of a strained sheet-metal specimen has been developed for measuring bending strains in the plastic range at 1500 F. In order to establish the accuracy of the method, the optical strain measurements were compared with those made with a resistance strain gage at room temperature on these three materials: nickel, Type 316 stainless steel, and Inconel X. At 1500 F, the standard which was chosen for comparison was stress calculations applied to Inconel X. In the current state of evaluation of the technique, the data which are being used for the purpose of reporting fatigue results are considered reliable to five percent. (Author)

AD-263 972 Div. 17
(TIPSM/BRW) OTS price $1.25

Watervliet Arsenal, N. Y.
SALT BATH HEAT TREATING PROCESSES,
by J. M. Barranco. Nov 60, 44p. incl. illus. tables (Technical rept. no. WVT RR 6017-1)
(Proj. no. DA 442-57(ORD))
Unclassified report

DESCRIPTORS: (*Steel, Processing, *Heat treatment, Austenite, Bainite, Martensite, Pearlite, Phase transitions, Transformations, Microstructure, Hardness, Grains (Metallurgy).) (Coolants, Salts, Cooling.)

The use of salt baths for quenching and solution treatment of steel was evaluated for the following steels: 4340, 4140, 8640, 4330 modified, and 4130. Marquenched specimens of 1/4 to 1 in. in diameter indicate that 4340 and 4330 modified steels most successfully fulfilled requirements while other steels failed to produce a homogeneous martensite. The austempered specimens of all steels tested indicate unwanted transformation products are included with the bainitic structure desired. Investigations of the solution treatment of steel indicate that doubling the normal holding time produced a substantial increase in hardness of the 4130 steel while some increase was noted in 4140 and 8640 steels. Doubling the holding times for 4340 and 4330 modified steels resulted in negligible differences in hardness. This behavior may be partly due to Va in the latter to control grain size. Also, both steels contain Ni which sometimes does not form any complex carbide requiring longer solution times. (Author)

Division 17 - METALLURGY

AD-263 975 Div. 17
(TIPSM/BRW) OTS price $.50

Watertown Arsenal Labs., Mass.
HEAT TREATMENT OF HIGH-STRENGTH STEELS THROUGH CONTROL OF QUENCHING TEMPERATURE.
Rept. on Research of Materials for High Temperature Use,
by S. V. Arnold. Sep 61, 11p. incl. illus. table (Technical rept. no. WAL TR 320.1/6)
Unclassified report

DESCRIPTORS: (*Steel, Tool steel, Processing, *Heat treatment, Austenite, Bainite, Martensite, Phase transitions, Transformations, Mechanical properties, Tensile properties, Microstructure.) Coolants, Oils, Salts, Cooling, Air.

Yield strength of suitable high-strength steels can be controlled by varying quenching temperature within the range of martensitic transformation followed by tempering at a single selected temperature. The mixed structures of martensite, low-temperature bainite and retained austenite produced by this practice possessed good ductility and toughness up to 235,000 psi yield strength in the particular steel investigated. The results suggest it should be possible to use the same salt bath both for a step-quench and also for tempering by maintaining a temperature slightly above the martensite start. The work piece would be initially quenched in the bath and held to equalize temperature, then it would be removed from the salt and cooled in air to the proper temperature within the transformation range, finally it would be returned to the salt bath for a sufficient period to complete transformation and temper the martensite which has been formed. Yield strength would be controlled by air cooling to the proper temperature after the initial quench. (Author)

AD-263 994 Div. 17
(TIPSM/EJH) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE EVALUATION OF SPECIAL METAL PROPERTIES.
Memo. no. 3, June-Aug 61,
by James E. Campbell. 27 Sep 61, 8p. incl. illus. tables (DMIC memo. no. 128)
Unclassified report

DESCNIPTORS: (*Alloys, *Low temperature alloys, Metals, Low temperature research, Tests, Test methods.) (*Titanium alloys, Aluminum alloys, Vanadium alloys, Oxygen.) (*Titanium alloys, Aluminum alloys, Tin alloys, Oxygen.) (*Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys.) (*Hydrogen embrittlement, Tests.) *Steel, Mechanical properties, Tensile properties, Fatigue (Mechanics), Fracture (Mechanics), Failure (Mechanics), Fuel tanks, Pressure vessels, Submarine hulls, Guided missiles, Aircraft.

A brief review of mechanical properties evaluation and tests for alloys to be used in liquefied gas fuel tanks, pressure vessels, submarine hulls, and aerospace vehicles is presented. Subjects include: (1) Effects of interstitial oxygen on the tensile properties of Ti alloys; (2) Effects of small flaws on the mechanical properties of steel and Ti alloys; (3) Methods of testing for hydrogen embrittlement.

AD-263 995 Div. 17
(TIPSM/BRW) OTS price $1.10

Frankford Arsenal, Philadelphia, Pa.
CORROSION RESISTANCE OF ANODIC COATINGS FOR ALUMINUM ALLOYS,
by Mark Sigismund. Feb 61, 6p. (Test rept. no. T61-12-1)
(Proj. 9530-0020)
Unclassified report

DESCRIPTORS: (*Aluminum alloys, *Corrosion inhibition, *Coatings, Anodes (Electrolytic cell), Aluminum compounds, Oxides, Chromates, Sulfates, Chemical reactions, Chromic acid, Sulfuric acid.) (Aluminum alloys, Corrosion, Military requirements, Specifications, Tests.) (Test methods, Corrosive gases, Vapors, Chlorides, Salts, Solutions.)

Conclusions: Neither the chromic acid nor the sulfuric acid anodizing to a minimum thickness is sufficient to protect Al against corrosion products formed upon exposure to both 5% and 20% salt fog, within the limits of MIL-A-8625A, although of sufficient thickness to permit compliance with tensile test requirements. (Author)

AD-264 015 Div. 17
(TIPSM/BRW) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
PHYSICAL METALLURGY OF TITANIUM ALLOYS.
Final rept.,
by B. L. Averbach and M. B. Bever. 19 Sep 61, 6p.
(Contract Nonr-184102)
Unclassified report

DESCRIPTORS: (*Titanium alloys, Metallurgy, Phase studies, X-ray diffraction analysis, Phase transitions, Transformations, Heat treatment, Aging, Mechanical properties, Tensile properties, Hardness, Resistance.) (Aluminum alloys, Vanadium alloys, Chromium alloys, Molybdenum alloys.) (Atomic structure, Crystal structure.)

AD-264 221 Div. 17, 12, 27
(TIPSM/EJH) OTS price $7.60

Dayton U. Research Inst., Ohio.
EVALUATION OF STRESSED AND UNSTRESSED MATERIALS IN SIMULATED HIGH ENERGY FUEL EXHAUST PRODUCT ENVIRONMENTS.
Rept. on Aviation Fuels,
by Joseph W. Rosenbery. Jan 61, 64p. incl. illus. tables.
(Contract AF 33(616)6198, Proj. 3048)
(WADD TR 60-179) Unclassified report

DESCRIPTORS: (*Heat resistant alloys, Corrosion resistant alloys, Alloys, Corrosion by Exhaust gases, Corrosive gases.) (Rocket fuels, *Fuel additives, Combustion, *Exhaust gases, Boron, Boron compounds, Oxides, Carbon.) (*Heat resistant alloys, *Metal coatings.) (*Nickel alloys, Chromium alloys, Molybdenum alloys, Titanium alloys, Iron alloys, Cobalt alloys, Tungsten alloys, Steel, Stainless steel.) (*Heat resistant alloys, Mechanical properties, Tensile properties, Microstructure.) (Silicon compounds, Carbides.) Test equipment, Test methods, Test facilities, Corrosion research.

The corrosion resistance of stressed and unstressed high temperature materials was evaluated during cylic exposure to simulated high energy fuel exhaust product environments. Results showed that the superalloy class of materials was not able to withstand corrosion in simulated high energy fuel exhaust product environments at temperatures above 2100 F. The amount of elemental B contained in the simulated high energy fuel exhaust products was directly relatable to the amount of property degradation observed. Where free B was present excessive formation of a boride phase was observed. (Author)

AD-264 222 Div. 17, 30
(TIPSM/BRW) OTS price $19.75

General Dynamics/Convair, San Diego, Calif.
CORRELATION OF TENSILE PROPERTIES OF STEEL CASTINGS AND MATERIAL IMPERFECTIONS AS DETERMINED BY RADIOGRAPHY.
Summary rept. for June 59-July 60 on the Chemistry and Physics of Materials,
by L. J. Mattek and R. D. Woodward. Feb 61,
325p. incl. illus. tables.
(Contract AF 33(616)6622, Proj. 7360)
(WADD TR 60-450) Unclassified report

DESCRIPTORS: (*Stainless steel, *Castings, Tensile properties, Mechanical properties, Elasticity, Deformation, Gases, Porosity, Slags, Radiography, *Non-destructive testing, Statistical analysis.) (Castings, Aircraft, Structures, Military requirements, Specifications, Non-destructive testing.)

The relationships between tensile properties of 410 stainless-steel castings and imperfections, as determined by radiography, were investigated. The purpose was to establish confidence in a system of evaluating castings by radiographic inspection. Tensile properties investigated were: tensile yield, tensile ultimate, elongation and modulus of elasticity; imperfections were: gas holes, inclusions and porosity; thicknesses were: 0.1, 0.2, 0.3, and 0.6 in. Test specimens were heat treated to a 180,000 to 200,000 psi. Statistical analysis of test results is presented. Relationships between tensile properties and size or intensity of imperfections are represented in tables and graphs. (Author)

AD-264 262 Div. 17
(TIPSM/BRW) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF HEAT TREATMENT AND WELDING CHARACTERISTICS OF B 120 VCA TITANIUM ALLOY SHEET, PART II.
Quarterly rept. no. 2, 16 Mar-15 June 61,
by John F. Rudy and Frank A. Crossley.
19 July 61, 6p. incl. illus. (ARF rept. no. 2211-2)
(Contract NOw 61-0351-c)
Unclassified report

DESCRIPTORS: (*Sheets, *Titanium alloys, Phase studies, Phase transitions, Welding, Heat treatment, Welds, Vibration, Magnetic fields, Aging.) (Mechanical properties, Tensile properties, Elasticity, Determination, Measurement.)

Moduli of elasticity (as a function of aging time) measurements are presented for heat-treated and aged (900 F for zero to 160 hr) weld metal and base metal (B120 VCA Ti alloy). The curve for the isothermal aged base metal lies above 16.3 x 10 to the 6th power psi for time in excess of 20 hr. The curve for the weld metal parallels the base metal but is about 0.5 x 10 to the 6th power psi lower. Flash annealing at 1000 F for 20 and 40 min. reduced the moduli of both the base and weld metals. Welds were made with magnetic stirring and vibration techniques in attempt to refine the weld metal grain structure. Weldments were reduced 25% by cold rolling in a further study of welding and aging sequences. The microprobe analyzer has not measured any significant variation in the amounts of the principle constituent elements resulting from the application of magnetic stirring to the molten weld metal.

AD-264 265 Div. 17
(TIPSM/BRW) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal progress rept. no. 10 (preliminary),
1-31 Aug 61.
21 Sep 61, 4p. incl. tables (Rept. no. L0414-01-10)
(Contract DA-04-495-ORD-3069)
Unclassified report

DESCRIPTORS: (*Rocket motors, *Rocket cases, Materials, *Alloys, Steel, Stainless steel, Titanium alloys, Stresses, Corrosion, Fracture (Mechanics).) (Tests, Test methods, Corrosive liquids, Corrosive gases, Tensile properties, Stresses, Failure (Mechanics).)

Bent-beam stress-corrosion test data are presented for specimens of Ladish D6AC, Type 300M, and Vasco-jet 1000 alloy steels, AM355 and PH 15-7 Mo stainless steels, and B120VCA titanium alloy tested in air, distilled water, tap water, 0.25% $Na_2Cr_2O_7 \cdot 2H_2O$ solution, 1% marquench salt solution, 3% NaCl solution, trichloroethylene, cosmoline, 4% soluble oil solution, and high humidity. Stress-corrosion test data are presented for U-bend specimens of Ladish D6AC, Type 300M, and Vasco-jet alloy steels tested in distilled water, tap water, 0.25% sodium dichromate solution, 1% marquench salt solution, 3% sodium chloride solution, trichlorethylene, cosmoline, and 4% soluble oil solution. Failures were observed with each alloy in distilled water, tap water, salt water, and trichloroethylene. In each case the Vascojet 1000 alloy showed the greatest susceptibility to stress-corrosion failure, while the Ladish D6AC alloy was the most resistant to stress-corrosion cracking. (Author)

AD-264 267 Div. 17, 27
(TIPSM/BRW) OTS price $1.60

Aerojet-General Corp, Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal progress rept. no. 9 (preliminary)
1 July-31 July 61.
15 Sep 61, 16p. incl. tables (Report no. L0414-01-9)
(Contract DA-04-495-ORD-3069)
Unclassified report

Division 17 - METALLURGY

DESCRIPTORS: (Rocket motors, *Rocket cases, Materials, Steel, Stainless steel, Titanium alloys, Stresses, Corrosion, Fracture (Mechanics).) (Tests, Test methods, Corrosive liquids, Corrosive gases, Tensile properties, Stresses, Failure (Mechanics).)

Results are tabulated for bent-beam stress-corrosion tests on specimens of Ladish D6AC, Type 300M, and Vascojet 1000 alloy steels, AM355 and PH 15-7 Mo stainless steel, and B120VCA Ti alloy. The specimens were stressed to 75% of the 0.2% offset yield strength; and tested in air, distilled water, tap water, 0.25% Na2Cr207.2H20 solution, 1% marquench salt solution, 3% NaCl solution, trichloroethylene, cosmoline, 4% soluble oil solution, and high humidity. The only alloy to fail consistently because of stress corrosion was Vascojet 1000 alloy steel. Results are tabulated for U-bend stress-corrosion tests on specimens of Ladish D6AC, type 300M, and Vascojet 1000 alloy steels tested in distilled water, tap water, 0.25% Na2Cr207.2H20 solution, 1% marquench salt solution, 3% NaCl solution, trichloroethylene, cosmoline, and 4% soluble oil solution. Failures were recorded for each alloy in distilled water, tap water, salt water, and trichloroethylene. The Vascojet 1000 alloy failed in the shortest time; the Ladish D6AC specimens recorded the longest times to failure.

AD-264 274 Div. 17, 15
(TIPSP/WH) OTS price $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SIMPLIFIED TREATMENT OF A MODEL FOR SUBSIDENCE,
by William C. Taylor. June 61, 12p. (BRL rept. no. 1134)
(Army Proj. 503-02-001)
Unclassified report

DESCRIPTORS: *Mining engineering, Mathematical engineering, Numerical methods and procedures, Integral equations.

A model for the subsidence of the earth over worked-out mines has been treated by Leser BRL Rept. no. 1131, Apr 61 and Giese BRL Rept. Here the same model is treated in a much simpler way to arrive at an integral equation related to, equivalent to, and slightly simpler than the one they found, discussed, and solved. A simpler method of making engineering estimates is proposed. A conjecture of possible mathematical interest is stated. (Author)

AD-264 291 Div. 17, 26
(TIPSM/EET) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF MOLYBDENUM AND MOLYBDENUM-BASE ALLOYS,
by J. A. Houck. 6 Oct 61, 3p. (DMIC Memo 129)
Unclassified report

DESCRIPTORS: (*Molybdenum, *Molybdenum alloys, Titanium alloys, Tungsten alloys, Zirconium alloys, Processing, Melting, Extrusion, Forging, Rolling mills, Sheets, Mechanical properties, Tensile properties, Creep, Fracture (Mechanics).)

AD-264 315 Div. 17, 26
(TIPSM/EET) OTS price $1.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
FABRICATION OF INTERNALLY STIFFENED TITANIUM CYLINDERS.
Interim rept. no. 5, 1 Apr-1 July 61,
by E. W. Moles. 1 July 61, 19p. incl. illus.
(Contract NOw 60-0173-c)
Unclassified report

DESCRIPTORS: (*Stiffened cylinders, *Titanium alloys, Production, Manufacturing methods.) (Metal plates, Processing, Extrusion, Rolling mills, Machining, Welding, Electric welding, Cutting torches, Hardness, Microstructure, Measurement.) (Stiffened cylinders, Chemical analysis, Tensile properties, Mechanical properties.)

AD-264 353 Div. 17, 25
(TIPSM/TCG) OTS price $2.60

Materials Research Lab., U. of Calif., Berkeley.
THERMODYNAMIC PROPERTIES OF COPPER-PALLADIUM ALLOYS.
Technical rept. no. 13, 1 Aug-31 Dec 60, on Heats of Formation of Alloys,
by James R. Guadagno, Raymond L. Orr, and Ralph Hultgren. 1 Sep 61, 23p. incl. illus. tables (Series no. 126, Issue no. 13)
(Contract DA 04-200-ORD-171, Proj. TB2-0001)
(AROD rept. no. 2287:13)
Unclassified report

DESCRIPTORS: (*Copper, *Copper alloys, *Palladium, *Palladium alloys, Thermodynamics, Heat of formation, Heat of solution, Transition elements, Metals, Alloys.) (Calorimeters, Tin, Liquid metals.) (X-ray diffraction analysis, Crystal structure, Lattices, Chemical analysis.)

The heats of formation of 6 Cu-Pd alloys were measured at 1000 K in a liquid Sn solution calorimeter. The heat of formation vs composition curve shows a maximum exothermic value between 40 and 45 at-% Pd, resembling the curve previously obtained for the Ag-Pd system and tending to verify Pauling's theory on the nature of atomic bonding. The data were combined with available free energy data to determine entropies of formation. The heats of solution obtained for Cu and Pd in dilute solution in liquid Sn at 775 K were + 2900 and - 25240 cal/g-atom, respectively. The alloys were analyzed chemically and lattice constants were determined from x-ray diffraction data. (Author)

AD-264 413 Div. 17, 26
(TIPSM/BRW) OTS price $5.60

Linde Co., Indianapolis, Ind.
FABRICATION AND PROPERTIES OF TUNGSTEN AND TUNGSTEN ALLOY SINGLE CRYSTALS.
Quarterly progress rept. no. 1, 29 June-29 Sep 61.
5 Oct 61, 53p. incl. illus. tables, 17 refs.
(Contract NOw 61-0671-c; In cooperation with Haynes Stellite Co.)
Unclassified report

DESCRIPTORS: (Single crystals, *Tungsten, *Tungsten alloys, Preparation, Growth, Processing, Mechanical properties, Physical properties.) (Tungsten, Additives of Niobium, Titanium, Zirconium, Hafnium, Iridium, Tantalum, Tantalum compounds, Carbides, Thorium compounds, Oxides, Potassium compounds, Silicates, Aluminum compounds.) (Processing, Surfaces, Grinders, Pickling, Heating, Forging, Rolling mills, Hardness, Crystallization, Crystal structure, Transition temperature, Determination.)

Efforts were made to evaluate the fabricability and properties of W and W alloy single crystals. Approximately 60 crystals were prepared with diameters from 1/2 to 1 in. and lengths ranging from 6 to 18 inches. Included in the program are several dilute alloys. The majority of crystals was successfully swaged, forged or rolled at temperatures far below those required to fabricate polycrystalline W. The influence of composition and orientation is currently being examined. The following properties are being determined on the fabricated material: hot hardness, recrystallization temperature, mechanical properties at elevated temperatures, and ductile to brittle transition temperature. (Author)

AD-264 431 Div. 17, 2
(TIPSM/BRW) OTS price $1.60

Reactive Metals, Inc., Niles, Ohio.
THE MANUFACTURE OF Ti-7Al-12Zr SHEETS.
Bi-monthly rept. no. 11, 30 Apr-30 June 61,
by J. K. Dietzel and S. R. Seagle. Aug 61,
11p. incl. illus. tables.
(Contract NOa(s) 59-6229-c)
Unclassified report

DESCRIPTORS: (*Sheets, *Titanium alloys, Aluminum alloys, Zirconium alloys.) (Production, Processing, Cleaning, Heat treatment, High temperature research, Melting, Rolling mills, Pickling, Manufacturing methods.) (Crystallization, Microstructure, Grains (Metallurgy), Mechanical properties, Creep, Tensile properties, Deformation, Surface properties, Contamination.

Annealing temperature studies were concluded. The results of these studies showed that the best combination of creep strength and ductility could be obtained by annealing in the 1550 to 1600 F range. Production work during this period involved rolling the remaining intermediate gage sheet to final size. (Author)

AD-264 434 Div. 17, 26
(TIPSM/LSK) OTS price $1.60

Republic Steel Corp., Canton, Ohio.
EVALUATION OF THE PRODUCIBILITY OF TWO NEW TITANIUM BASE SHEET ALLOYS, Ti-7Al-12Zr AND Ti-5Al-5Zr-5Sn.
Bi-monthly rept. no. 8, 1 May-30 June 61,
by M. Scott and T. Vretas. 18 July 61, 12p. incl. tables.
(Contract NOa(s) 60-6035-c)
Unclassified report

DESCRIPTORS: (*Titanium alloys, *Sheets, Aluminum alloys, Zirconium alloys, Tin alloys, Hydrogen.) (Production, Processing, Heat treatment, Rolling mills, Pickling.) (Tensile properties, Mechanical properties, Surface properties, Contamination.)

Additional work was performed for the Phase 1 portion of the contract. Testing of finished mill processed 0.020, 0.040, 0.060, and 0.080 in. gage sheet showed the sheets to be quite brittle. Additional total gage removal varying from 0.005-0.026 in. from these sheets was beneficial in making more ductile sheets but did not restore the original ductility as indicated by bend test results. These data suggest the existence of metallurgical instability in the alloy arising from mill processing. Mill processing of 0.030 and 0.050 in. gage sheet product, Ti-5Al-5Zr-5Sn, Heat XT-70029 is in progress. Tensile test, bend test, and hydrogen content data have been developed for sheets ready for vacuum annealing. Additional total gage removal of 0.006 in. is necessary for the sheets before vacuum annealing. (Author)

AD-264 448 Div. 17
(TIPSB/CCH) OTS price $1.60

Stanford U., Calif.
GRAIN GROWTH RESTRAINT IN SILVER BY OXYGEN,
by Mark J. Klein and Robert A. Huggins. Sep 61, 7p. illus. (Technical rept. no. 4; DMS rept. no. 61-13)
Contract Nonr-22534, Proj. NR 031-577)
Unclassified report

DESCRIPTORS: (*Grains (Metallurgy), Growth, Inhibition in *Silver by Oxygen.)

The presence of a small amount of oxygen was found to cause significant grain growth restraint in 99.99% silver. This behavior does not seem to be due to the presence of an oxide dispersion. In the amounts necessary to cause the observed effects it was found that oxygen migrates very rapidly. (Author)

AD-264 459 Div. 17, 8
(TIPSM/BRW) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATIONS OF ELECTRON DEVICE MATERIALS TECHNOLOGY STUDIES OF BRAZING AND METAL-JOINING PROBLEMS.
Final rept.,
by Lester Feinstein. July 61, 60p. incl. illus. tables.
(Contract AF 19(604)7323)
(AFCRL 596) Unclassified report

DESCRIPTORS: (*Electron tubes, Materials, Processing, Manufacturing methods, *Metal joints, *Brazing, Diffusion on *Molybdenum by Soldering alloys, Nickel alloys, Gold alloys, Chemical reactions, Diffusion, Intermetallic compounds, Gold compounds, Molybdenum compounds, Nickel compounds, Brittle materials.) (Molybdenum, Nickel, Eutectics, Solubility, Melting, Welded joints, X-ray spectroscopy.) Microstructure, Tensile properties, Mechanical properties.

Studies were made of the effect of diffusion on brazed joints in electron tubes and exposed to relatively high temperatures. Mo was chosen as the base metal because it is used in locations where it will be subjected to elevated temperatures. Brazes were made with an Au-Ni filler. The brazed assemblies were heat-treated at different temperatures for 7 and 21 hours. Because

of diffusion, an intermetallic compound of Au-Ni-Mo was formed. The room-temperature strength of the joints with large amounts of this compound was considerably lower than that of joints without it. An additional study was made of a joint in which the brazing filler was in solution in the Mo base metal. By keeping the brazed assembly slightly above the eutectic temperature for about 5 hr, joints were made that had Ni completely in solution in some areas and that were not susceptible to the formation of intermetallic compounds. (Author)

AD-264 470 Div. 17, 26
(TIPSM/LSK) OTS price $1.60

Solar Aircraft Co., San Diego, Calif.
DEVELOPMENT OF LOW TEMPERATURE BRAZING OF TUNGSTEN FOR HIGH TEMPERATURE SERVICE.
Interim rept. no. 2, 16 May-15 July 61,
by N. B. Elsner and W. C. Troy. 14 Aug 61, 13p. incl. illus. tables (Rept. no. RDR 1249-2)
(Contract NOw 61-0414-c)
Unclassified report

DESCRIPTORS: (*Tungsten, Brazing with Boron alloys, Platinum alloys, Soldering alloys, Welding rods.) (Low temperature research, *Brazing and High temperature research, Diffusion, Joints, Metal joints, Welded joints, Thickness, Crystallization.)

Tungsten specimens reaction brazed with Pt-B alloys plus tungsten powder at 2000 F have given remelt temperatures as high as 3780 F. Subsequent three hour diffusion treatments of the brazed joints at 2000 F have increased the remelt temperature up to 3840 F. Investigation of several Ir-B alloys has shown alloys of this system capable of brazing tungsten below its recrystallization temperature. (Author)

AD-264 473 Div. 17, 26
(TIPSM/EET) OTS price $1.10

Titanium Metals Corp. of America, Toronto, Ohio.
THE PRODUCTION AND WELDING OF HEAVY Ti-13V-11Cr-3Al TITANIUM ALLOY PLATE.
Bimonthly rept. no. 8, 1 June-31 July 61,
by D. R. Mitchell. 25 Aug 61, 9p. tables.
(Contract NOa(s) 60-6092-c)
Unclassified report

DESCRIPTORS: (*Metal plates, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Welding, Welds, Welded joints, Impact shock, Tensile properties, Creep, Machining.) (*Titanium alloys, Wire, Welding, Fracture (Mechanics), Mechanical properties, Chemical analysis, Processing, Production, Manufacturing methods.)

A weld was made with Ti-6Al-4V filler material and has been partially evaluated. Results are presented along with the properties obtained from a previous weldment made with Ti-13V-11Cr-3Al filler. Welds made with matching filler (Ti-13V-11Cr-3Al) had very low tensile ductilities and impact strengths. The use of Ti-6Al-4V filler improved both ductility and impact strengths but there is evidence of a brittle transitional zone between the base metal and the weld. (Author)

AD-264 474 Div. 17, 26
(TIPSM/EET) OTS price $1.60

Titanium Metals Corp. of America, Toronto, Ohio.
THE PRODUCTION AND WELDING OF HEAVY Ti-13V-11Cr-3Al TITANIUM ALLOY PLATE.
Bimonthly rept. no. 7, 1 Apr-31 May 61,
by D. R. Mitchell. 21 July 61, 18p. incl. illus. tables.
(Contract NOa(s) 60-6092-c)
Unclassified report

DESCRIPTORS: (*Metal plates, *Titanium alloys, Vandium alloys, Chromium alloys, Aluminum alloys, Welding, Arc welding, Helium, Argon, Shielding, Welding rods, Titanium, Wire, Welds, Welded joints, Mechanical properties, Fracture (mechanics), Chemical analysis.) (Ship plates, Processing, Production, Manufacturing methods.)

Forty units of 2x8x30-in. Ti-13V-11Cr-3Al plate were shipped. Four welds were completed. Three of these welds were made with Ti-13V-11Cr-3Al filler material, the fourth weld was made with Ti-55A commercially pure filler. Cracking of the welds due to restraint was a severe problem. Only one weld, made with Ti-13V-11Cr-3Al filler and a 500 F preheat, was completed without severe cracking. This weld is being prepared into various test specimens to evaluate the mechanical properties of the weld zone. The parameters of welding 2-in Ti-alloy plate were investigated and are discussed. (Author)

AD-264 475 Div. 17, 26
(TIPSM/BRW) OTS price $3.60

Titanium Metals Corp. of America, Toronto, Ohio.
TITANIUM SHEET ROLLING PROGRAM FOR Ti-8Al-1Mo-1V, Ti-5Al-5Sn-5Zr, AND Ti-7Al-12Zr.
Bimonthly rept. no. 9, 1 Nov-31 Dec 60,
by D. L. Day and H. D. Kessler. 7 July 61, 36p. incl. illus. tables.
(Contract NOa(s) 59-6227-c)
Unclassified report

DESCRIPTORS: *Sheets. (*Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (*Titanium alloys, Aluminum alloys, Tin alloys, Zirconium alloys.) (*Titanium alloys, Aluminum alloys, Zirconium alloys.) (Production, Manufacturing methods, Processing, Rolling mills, Welding, Heat treatment.) (Processing, Heat treatment, Mechanical properties, Tensile properties, Creep, Determination, Temperature, Microstructure, Stresses, Corrosion, Oxygen, Hydrogen, Tests.)

Tensile and bend properties were obtained on 30 pilot sheets of Ti-8Al-1Mo-1V alloy, which indicated that mill annealing for 4 hr at 1450 F provides sub-standard creep resistance at 1000 F. Additional laboratory studies showed that a much better combination of properties is achieved by mill annealing for 8 hr at 1450 F. The 92 remaining sheets from the five 1600-lb heats were finish rolled from 1800 F and will be mill annealed at 1450 F (8 hr). Preliminary evaluation of the initial sheets of Ti-5Al-5Sn-5Zr and Ti-7Al-12Zr alloy was completed including notch and standard tensile properties at several different temperatures and 1000 F creep-stability studies. An optimum finish rolling temperature of 1750 F was established for both alloys, but additional studies are required before the optimum final annealing temperature can be selected. Melting of three 1700-lb ingots of each of Ti-5Al-5Sn-5Zr and Ti-7Al-12Zr alloys was scheduled for production. (Author)

AD-264 476 Div. 17, 26
(TIPSM/BRW) OTS price $1.10

Titanium Metals Corp. of America, Toronto, Ohio.
TITANIUM SHEET ROLLING PROGRAM FOR Ti-8Al-1Mo-1V, Ti-5Al-5Sn-5Zr, and Ti-7Al-12Zr.
Bimonthly rept. no. 10,
by D. L. Day and H. D. Kessler. 31 July 61, 9p. tables.
(Contract NOa(s) 59-6227-c)
Unclassified report

DESCRIPTORS: *Sheets, (*Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (*Titanium alloys, Aluminum alloys, Tin alloys, Zirconium alloys.) (*Titanium alloys, Aluminum alloys, Zirconium alloys.) (Production, Manufacturing methods, Processing, Rolling mills, Welding, Heat treatment.) (Processing, Heat treatment, Mechanical properties, Tensile properties, Creep, Hydrogen, Tests, Elasticity, Measurement.)

Ninety-two sheets of Ti-8Al-1Mo-1V alloy from the five heats were mill annealed at 1450 F (8 hr) and finishing operations were scheduled. Laboratory studies are in progress on the investigation of the effect of hydrogen, modulus of elasticity measurements, and a more thorough evaluation of various duplex annealed properties of Ti-8Al-1Mo-1V alloy sheet. Additional creep-stability tests are in progress on Ti-5Al-5Sn-5Zr and Ti-7Al-12Zr alloys to determine the optimum final annealing cycle for each. Other evaluation programs are in progress including welding and hydrogen studies. The balance of sheet bar material from the first ingot of each of Ti-5Al-5Sn-5Zr and Ti-7Al-12Zr alloys was finish rolled from 1750 F, mill annealed, and will be finish annealed as soon as the optimum cycle for each has been established. Three 1700-lb heats of each alloy were melted and processing has been scheduled. (Author)

AD-264 477 Div. 17, 26
(TIPSM/EET) OTS price $3.60

Titanium Metals Corp. of America, Toronto, Ohio.
TITANIUM SHEET ROLLING PROGRAM FOR Ti-8Al-1Mo-1V, Ti-5Al-5Sn-5Zr, and Ti-7Al-12Zr.
Bimonthly rept. no. 8, 1 Sep-31 Oct 60,
by D. L. Day and H. D. Kessler. 30 June 61, 32p. incl. illus. tables.
(Contract NOa(s) 59-6227-c)
Unclassified report

DESCRIPTORS: (*Sheets, Processing, Rolling mills, *Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys, Tin alloys, Zirconium alloys, Heat treatment, Cooling, Creep, Tensile properties, Mechanical properties, Stresses.)

A study was made to determine the effects of various simple, duplex, and mill annealing variables on the tensile and 1000 F creep resistance of Ti-8Al-1Mo-1V sheet. Mill annealing at 1450 F was established as an optimum to provide 130 ksi yield strength with good creep resistance. Solution annealing at temperatures of 1825 to 1850 F improves the creep properties substantially. A group of 30 Ti-8Al-1Mo-1V sheets were finish rolled from 1800 F, and laboratory annealing of hot rolled samples substantiated the previous conclusion that good tensile and creep properties are obtained by annealing at 1450 F. (Author)

AD-264 522 Div. 17
(TIPSM/BRW) OTS price $9.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
HIGH ALLOY STEELS AND HEAT RESISTANT ALLOYS,
by N. I. Korneyev and I. O. Skugarev. 4 Apr 61, 102p. (Trans. no. MCL-1004 of Osnovy Fiziko-Khimicheskoy Teorii Obrabotki Metallov Davleniyem, Moscow, pp. 80-149, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Steel, Plasticity, Deformation, Hardness.) (*Steel, Iron alloys, *Chromium alloys, *Nickel alloys, Additives of Aluminum, Cobalt, Manganese, Titanium, Vanadium on Plasticity, Hardening, Crystal structure, Grains (Metallurgy), Intermetallic compounds.) (Technological intelligence, Translations on USSR.) (Heat resistant alloys, Steel, Processing, Heat treatment, Heating, Forging, Deformation, Hardness, Phase transitions, Transition temperature, Microstructure, Crystallization, Grains (Metallurgy, Impurities, Dispersion hardening, *Alloys.)

Contents:
Plasticity diagrams of highly alloyed steels
Variations in the plasticity and deformation-resistance in relation to the status of tension
Deformation resistance of the high-alloy metals
Changes in macrostructure and in mechanical characteristics in relation to general deformation
Diagrams of work-recrystallization, establishing of the work temperatures and of the critical deformations
Structure of high-alloy materials and its effects upon plasticity
Thermo-mechanical conditions of pressure working of high alloy metals

AD-264 524 Div. 17, 25
(TIPSM/EET) OTS price $3.60

Illinois U., Urbana.
BRITTLE-FRACTURE PROPAGATION IN WIDE STEEL PLATES.
Final rept.,
by W. J. Hall, S. T. Rolfe and others. 3 Oct 61, 29p. incl. tables, 16 refs. (Serial no. SSC-131)
(Contract NObs-65790; In cooperation with Committee on Ship Structure, National Research Council Contract NObs-72046)
Unclassified report

DESCRIPTORS: (*Fracture (mechanics), Ship plates, Metal plates, *Steel.) (Test methods, Test equipment, Elasticity, Deformation, Strain gages, Stresses, Rupture, Propagation, Measurement.) Tests, Mathematical analysis, Lattices.

A fundamental fracture mechanics investigation was concerned with studies of the propagation of brittle fractures in wide steel plates in an attempt to delineate many of the parameters associated with a propagating fracture, and in particular to study the strain field surrounding a propagating brittle fracture. Tests were made on structural-steel plate specimens, either 2 or 6 ft in width. In most cases the plate specimens were stressed uniaxially to about 19,000 psi, cooled to about 0 F, and a fracture was started with the notch-wedge-impact method of fracture initiation. Measurements of the strain distribution on the surface of the plate

and the crack speed were made as the fracture traversed the plate. The majority of the recorded fracture speeds ranged from 2000 to 4000 fps. The strain field surrounding the tip of an advancing fracture appeared to remain essentially unchanged after traversing about one-third the width of a 6-ft-wide plate. Exploratory studies were also made of the propagation of brittle fractures in prestressed plates. Analytical studies of plate response incated that the lattice representation is a promising method of studying plate response during fracture propagation. (Author)

AD-264 550 Div. 17, 26
(TIPSM/EET) OTS price $14.00

Crucible Steel Co. of America, Midland, Pa.
IMPROVED TITANIUM ALLOY SHEET (B120VCA).
Final technical rept. 30 June 58-31 Mar 61 on B120VCA Titanium Alloy Sheet Rolling Program,
by A. E. Leach and H. A. Clampett, Jr.
1 Apr 61, 205p. incl. illus. tables.
(Contract NOa(s) 58-881-c)
Unclassified report

DESCRIPTORS: (*Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Production, Manufacturing methods, Processing, Melting, Forging, Welding, Rolling mills, Heat treatment, Mechanical properties, Tensile properties, Creep.) (Sheets, Welding rods, Wire, Foils.) (Airframes, Materials.)

The results of a comprehensive test program to collect and analyze certain selected fabricability and design data are presented. Over 11,000 lb of B120VCA hand sheet, welding wire, ribbon wrap, and foil were produced and distributed to airframe manufacturers, Government agencies and research laboratories for design data collection and fabrication study. Ingot chemical homogeneity was investigated and found to be excellent. The material produced was pedigreed as to its location within the ingot and mechanical property performance. These properties were analyzed statistically to provide criteria for establishing property variation due to a variety of processing factors and possible specifications. (Author)

AD-264 571 Div. 17, 26, 1
(TIPSM/REB) OTS price $21.00

General Dynamics/Convair, San Diego, Calif.
TITANIUM DEVELOPMENT PROGRAM. (VOLUME I).
Final technical engineering rept., vol. 1, Dec 57-May 61,
by C. W. Alesch and S. R. Carpenter. May 61, 383p. incl. illus. tables.
(Contract AF 33(600)34876, Proj. 7-576)
(ASD TR 61-576, vol. 1) Unclassified report

DESCRIPTORS: (*Titanium alloys, Processing, Manufacturing methods, *Heat treatment, Aging, Mechanical properties, High temperature research, Low temperature research, Stability, Metallurgy, Stresses, Welds, Spot welds, Tests.) (Airframes, Materials, Alloys.) (Titanium alloys, Aluminum alloys, Vanadium alloys.) (Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys.) (Titanium alloys, Aluminum alloys, Chromium alloys, Iron alloys.)

This volume describes the qualification tests and evaluations performed prior to selection of the Ti alloy most suitable for use in advanced design aircraft components. Ti-4Al-3Mo-1V alloy was selected, in the basic evaluation, over Ti-2.5Al-16V and Ti-6Al-4V because of its greater desirability for satisfying engineering properties requirements, acceptability of mode of heat treatment and over-all manufacturing capabilities for airframe construction employing solution heat treated and aged Ti alloys. Ti-13Cr-11V-3Al was selected, in the supplemental limited evaluation, over Ti-5Al-2.75Cr-1.25Fe due to its superior mechanical property values and spot weld strength values. (Author)

AD-264 572 Div. 17, 26, 1
(TIPSM/REB) OTS price $18.00

General Dynamics/Convair, San Diego, Calif.
TITANIUM DEVELOPMENT PROGRAM. VOLUME II.
Final technical engineering rept., vol. 2, Dec 57-May 61,
by C. W. Alesch and S. R. Carpenter. May 61, 286p. incl. illus. tables.
(Contract AF 33(600)34876, Proj. 7-576)
(ASD TR 61-7-576, vol. 2) Unclassified report

DESCRIPTORS: (*Titanium alloys, Processing, Manufacturing methods, *Heat treatment, Aging, Mechanical properties, Deformation, Creep, Tensile properties, Tables, Data.) (Airframes, Materials, Alloys.) (Titanium alloys, Aluminum alloys, Vanadium alloys.) (Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys.) (Titanium alloys, Aluminum alloys, Chromium alloys, Iron alloys.)

Detailed incoming inspection data, inspection control chart data, creep test curves and curves comparing properties of various alloys are recorded. (Author)

AD-264 609 Div. 17, 30
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENT IN THE DEVELOPMENT OF AN OPTIMAL REGIME FOR MELTING STAINLESS STEELS IN VACUUM ARC FURNACES,
by E. I. Serebriyskiy and I. V. Polin. 28 Aug 61, 16p. incl. tables (Trans. no. MCL-1007 of Metallurgiya, Sbornik Statey 2:22-32, 1959)
Unclassified report

DESCRIPTORS: (*Stainless steel, Austenite, Processing, Purification, *Melting, Vacuum furnaces, Electric arcs, Operation.) (Impurities, Slags, Gases, Hydrogen, Nitrogen, Oxygen.) (Technological intelligence, Translations, USSR.) (Effectiveness, Degasification, Electric currents, Electric potential, Electrodes, Molding materials, Copper, Liquid cooled, Water, Pressure.) Stirrers, Electromagnetic fields.)

An investigation was made of the factors influencing the quality of steel in terms of nonmetallic inclusions and gases and to develop an optimal technique for melting stainless steel in vacuum arc furnaces. The factors included: (1) the area ratio of cross sections of the electrode and the ingot mold (water cooled Cu; (2) the current density; (3) the effect of applied power;

and (4) the effect of pressure (degree of vacuum). On the basis of the results obtained with a series of austenitic stainless steels of types 18/9 and 15/15 Cr/Ni with Mo, Ti, and Nb in various combinations, it was recommended that current densities of not less than 150 amp/sq cm be applied to the electrodes, the area ratio of the electrode and ingot mold should be between 0.3 and 0.45, and the pressure in the furnace should not be more than 0.01 mm Hg.

AD-264 610 Div. 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
STRUCTURE DIAGRAM AND SOME PROPERTIES OF ALLOYS OF THE SYSTEM NIOBIUM-MOLYBDENUM-VANADIUM,
by V. V. Baron, K. N. Ivanova, and E. M. Savitsky. 21 Aug 61, 17p. (Trans. no. MCL-1170 of Izvestiya Akademii Nauk SSSR - Otdeleniye Tekhnicheskikh Nauk - Metallurgiya I Toplivo 4:143-149, 1960)

Unclassified report

DESCRIPTORS: (Molybdenum, Niobium, Vanadium, Phase studies, Microstructure, Crystal structure, X-ray spectroscopy.) (Heat resistant alloys, Corrosion resistant alloys, *Molybdenum alloys, *Niobium alloys, *Vanadium alloys, Hardness, Oxidation, Measurement.) (Technological intelligence, Translations, USSR.) (Solids, Liquids, Solutions, Melting, Temperature.)

The structure and properties of alloys of the ternary system Nb-Mo-V were investigated. The alloys were smelted in an arc furnace with a permanent W electrode on a water-cooled Cu hearth in a medium of purified He. Niobium alloys with 5% M, 2.8% V and 5% Mo, 5.6% V showed the highest oxidation resistance at 1000 and 1200 C. An improved high temperature corrosion resistance of ternary Nb alloys was observed at a lower alloying percentage than in the case of binary alloys. The oxidation rate of ternary alloys was occasionally higher at 1000 than at 1200 C. On the basis of investigations of microstructures of cast and annealed alloys, their hardness and the determination of their melting point, the phase diagram of the system Nb-Mo-V was plotted. The existence in the Nb-Mo-V of an interrupted zone of solid solutions was established. (Author)

AD-264 611 Div. 17, 4
(TIPSM/SEB) OTS price $4.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
EXTRACTION OF RUBIDIUM AND CESIUM FROM MINERALS AND ORES,
by F. M. Perel'man. 15 Sep 61, 42p. incl. illus. tables, 56 refs. (Trans. no. MCL-1225 of Rubidium and Cesium, pp. 103-129, 1960)

Unclassified report

DESCRIPTORS: (*Bibliography of Processing, Purification, *Minerals, *Ores.) (Technological intelligence, Translations, USSR.) (Alkali metals, *Rubidium, *Cesium, Separation, Chemical analysis, Quantitative analysis, Electrolysis.)

A review of the literature on the extraction of rubidium and cesium from minerals and ores is presented. Topics included are: (1) extraction of Rb and Cs from lepidolites; (2) extraction of Cs from pollucite; (3) extraction of Rb from carnallite; (4) processing other types of raw materials; (5) production of metallic Rb and Cs; and (6) electrochemistry of Rb and Cs.

AD-264 613 Div. 17, 18
(TIPSB/CW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CERTAIN REGULARITIES IN THE FORMATION OF THE SIGMA PHASE IN STEEL WITH 18% Cr AND 14% Mn,
by O. A. Bannykh and I. F. Zudin. 28 Aug 61, 11p. 11 refs. (Trans. no. MCL-1021 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:187-194, 1960)

Unclassified report

DESCRIPTORS: (*Ferrites, Decomposition.) (*Steel, Transformations, Hardness, Measurement, Microstructure, Analysis.) (*Technological intelligence, *USSR.) *Translations.

In a steel with 18% Cr and 14% Mn after quenching in water from 1100 degrees, the decomposition of the ferrite upon tempering begins with precipitation of carbides arranged in chains along the grain boundaries. The process of precipitation of the sigma-phase is accompanied by a considerable rise in hardness. The precipitation of the carbides in tempering results in a reduction of strength and ductility, while decomposition of the ferrite with formation of the sigma-phase sharply increases the strength and diminishes the ductility of the steel. The activation energy of the process of precipitation of the sigma-phase (in the 500 - 700 temperature intervals), computed in terms of the curve of change in hardness upon tempering constitutes approximately 29 kcal/gm/atom. If the tempering time is constant, the particle size of the sigma-phase will be greater, the higher the temperature of tempering. Moreover, the particle size is exponentially related to the tempering temperature. For 100 hrs tempering time, the activation energy of growth of sigma-phase particles is approximately 14 kcal/gm/atom. (Author)

AD-264 614 Div. 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF THE CHROMIUM-NICKEL-NIOBIUM TERNARY SYSTEM,
by V. N. Svechnikov and V. M. Pan. 28 Aug 61, 16p. incl. tables, 18 refs. (Trans. no. MCL-1025 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:240-250, 1960)

Unclassified report

DESCRIPTORS: (*Chromium, *Nickel, *Niobium, Phase studies, Intermetallic compounds, Niobium compounds, Chromium compounds, Nickel compounds, Heat resistant alloys, *Niobium alloys, *Chromium alloys, *Nickel alloys, Preparation, Microstructure, Crystal structure, X-ray spectroscopy.) (Technological intelligence, Translations on USSR.)

An effort was made to plot the boundaries of the phase zones of the ternary system Cr-Ni-Nb, limited to that portion of the concentration triangle between a line for the binary Cr-Ni alloys and a line connecting the intermetallic compounds NbCr2 and Ni3Nb. Each of the ternary systems (Cr-Ni-Ni3Nb and Cr-NbCr2-Ni3Nb) have a phase equilibrium diagram which, at 1100 C, contains intervals of single, double, and triple-phase equilibria. A eutectoid transformation is apparently lacking in the Cr-Ni system. An anomalous variation in volume occurs when certain alloys of the Cr-Ni system quenched from 1310 C are tempered. The boundaries of the phase intervals in an isothermal cross section of the phase diagram of the Cr-Ni-Nb system were plotted for 1100 C. (Author)

AD-264 615 Div. 17, 26
(TIPSM/BRW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DEEP STABILIZATION AS A METHOD OF INCREASING THE LONG-TERM HEAT RESISTANCE AND DUCTILITY OF ALLOYS,
by Ye. Ye. Lebin and Ye. M. Pivnik. 28 Aug 61, 8p. (Trans. no. MCL-1022 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:195-200, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Nickel alloys, *Heat treatment, Mechanical properties, Stability, Stabilization, Aging, High temperature research.) (Turbine blades, Turbine stators, Gas turbine blades, Gas turbine disks, Gas turbine rotors, Turbines, Steam.) (Technological intelligence, Translations on USSR.)

A number of examples are presented to illustrate the possibilities of a method of heat treatment of high-temperature alloys for blades, wheel mounts, and other parts of modern gas and steam turbines. The high degree of stabilization of the alloy properties was confirmed by short-term mechanical tests of samples at various stages of aging at 750 C. The hot strength of Ni-base alloys was in direct relationship to the degree of stabilization by prior heat treatment. The required stabilization was obtained by a multiple-step stabilization treatment after austenizing and consisted of tempering at 1000, 900, and 800 or 850 C. The duration and temperature of the final stages of stabilization (at 700, 750 or 650 C) were determined experimentally in each individual case and, in addition to consideration of the individual characteristics of the alloy, by the service temperature at which the parts made of these alloys are used. (Author)

AD-264 618 Div. 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE CONTRIBUTION TO THE PROBLEM OF THE EFFECT OF PRESSWORKING UPON THE STRESS-RUPTURE CHARACTERISTICS AND DUCTILITY OF ALLOYS,
by A. N. Danil'chenko, M. V. Rastegayev, and V. Ya. Mezis. 28 Aug 61, 18p. 18 refs. (Trans. no. MCL-1024 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:211-222, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, Nickel alloys, Heat treatment, *Plasticity, *Deformation, Metal forming presses, Stresses, Rupture, Mechanical properties, Tensile properties, Impact shock.) (Heat treatment, Deformation, Grains (Metallurgy), Crystal structure.) (Technological intelligence, Translations on USSR.)

A brief review of the influence of plastic deformation upon certain properties of metals and alloys in high-temperature ranges, and the results of an investigation of an Ni-based alloy are presented. The heat-resistant properties of deformed alloys not subject to heat treatment diminish and achieve minimal values when upset more than 45%. Heat treatment of a deformed alloy when the degree of deformation exceeds 70%, may, in some cases, sharply increase the time to failure. With medium degrees of deformation (40 - 50%), heat treatment leads to an insignificant increase of time to failure as compared to that of an alloy deformed to the same degree but not subject to heat treatment. Heat treatment of an alloy in the cast condition results in a substantial rise in the maximum indices of stress-rupture strength as compared to that of cast alloy not subjected to heat treatment. (Author)

AD-264 621 Div. 17, 26
(TIPSM/BRW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF THE TECHNOLOGY FOR MELTING STAINLESS STEELS IN VACUUM ARC FURNACES,
by E. I. Serebriyskiy and I. V. Polin. 28 Aug 61, 30p. (Trans. no. MCL-1006 of Metallurgiya, Sbornik Statey 2:3-21, 1959)
Unclassified report

DESCRIPTORS: (Austenite, *Stainless steel, Purification, Melting, Electric arcs, Vacuum furnaces, Vibration, Impurities, Slags, Gases.) (Steel, Deoxidation, Hydrogen.) (Technological intelligence, Translations on USSR.) (Vacuum furnaces, Operation, Metallurgy.)

High-purity austenitic stainless steel, low in nonmetallic inclusions and gases, with the use of vacuum arc furnaces and ordinary charge materials, may be obtained by (1) melting the billet from charge materials in an induction vacuum furnace, (2) remelting this billet in a vacuum arc furnace with the use of H deoxidation, (3) vibrating the molten metal, and (4) remelting the ingot in the vacuum arc furnace under a layer of fluid flux. The surface of the ingot melted in vacuum arc furnaces with water-cooled copper igot molds was better than the surface of ingots melted in air (except for reversed polarity melting), and was particularly good when the remelting was performed under a layer of flux. This permitted a substantial reduction in the loss of metals during rough machining of the ingots, and in a number of cases made it possible to eliminate machining completely. (Author)

AD-264 624 Div. 17, 26
(TIPSM/BRW) OTS price $5.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METALLURGY, SCIENCE OF METALS, PHYSICO-CHEMICAL

METHODS OF RESEARCH.
22 Aug 61, 57p. (Trans. no. MCL-1052 of Trudy Instityta Metallurgii im. A. A. Baikova AN. SSSR, Vyp 5, Metallurgiya Metallovedeniye, Fiziko-Khimicheskiye Metody Issledovaniya, Moskva, Izvo AN SSSR 5:pp. 22-49, 156-161, 1960)
Unclassified report

DESCRIPTORS: (*Steel, *Deoxidation, Melting, Casting, Impurities, Chemical impurities, Oxides, Sulfides, Ores, Mechanical properties, Crystal structure.) (*Cermets, Molybdenum compounds, Silicides, Nickel alloys, Cobalt alloys, Vanadium alloys, Niobium alloys, Molybdenum alloys, Phase studies, Microstructure, Crystal structure, Mechanical properties, Tensile properties, Hardness, Plasticity, Preparation.) (Technological intelligence, Translations on USSR.) *Metallurgy, Alloys, Test methods.

CONTENTS:
Effects of deoxidation with a complex alloy of Mn, Si and Al upon the amount and composition of oxide inclusions in steel
To the problem of applying the results of mechanical testing to the evaluation of the technique of steel melting and pouring
On the crystallization sequence of non-metallic inclusions in steel and of sulfides and oxides in ores
Investigation of the structure and physio-mechanical characteristics of the alloys of molybdenum di-silicide with Ni, Co, Va, and Nb

AD-264 628 Div. 17, 25
(TIPSM/BRW) OTS price $8.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
FATIGUE OF METALS (SELECTED ARTICLES).
21 Aug 61, 83p. 23 refs. (Trans. no. MCL-1054 of Ustalost' Metallov, Materialy Soveshchaniya Po Ustalosti Metallov 22-24 Sentyabrya 1958 g., Moskva, Iz-vo AN SSSR: pp. 34-46, 62-79, 1960)
Unclassified report

DESCRIPTORS: (*Metals, *Alloys, *Fatigue (Mechanics), Fracture (Mechanics), Plasticity, Deformation, Stresses, Shear stresses, Mechanical properties, Tensile properties.) (*Steel, Stainless steel, Brass, Aluminum alloys, Copper alloys, Magnesium alloys, Titanium alloys, Tests.) (Hardness, Aging, Heat treatment, Mechanical properties, Impact shock, Sensitivity.) (Technological intelligence, Translations on USSR.)

CONTENTS:
Strength at repeated loadings and resistance to fracture, by S. I. Ratner
Concerning sensitivity of high strength steels to notching, by M. P. Markovets
Concerning notch sensitivity of high strength steels, by S. Ye. Belyayev

AD-264 660 Div. 17, 27
(TIPSM/BRW) OTS price $7.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Annual summary for 1 July 60-30 June 61, by R. B. Robinson and R. J. Uzdarwin. Aug 61, 73p. incl. illus. tables (Rept. no. 2092)
(Contract DA-04-495-ORD-3069)
Unclassified report

DESCRIPTORS: (*Corrosion research on *Alloys, Materials for Solid rocket propellants, Rocket motors, *Rocket cases.) (*Steel, *Stainless steel, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Stresses, Corrosion.) (Test methods, Corrosive gases, Corrosive liquids, Air, Water, Water vapor, Salts, Sodium compounds, Chlorides, Nitrates, Nitrites, Ethylenes, Oils, Stresses, Deformation, Sheets.) Mechanical properties, Tensile properties, Microstructure, Fracture (Mechanics).

Six high-strength alloys were evaluated for stress-corrosion susceptibility in environments representative of those environments to which the alloys are normally exposed during the manufacture, hydrostatic testing, and storage of solid-rocket-motor cases. The alloys were heat-treated or cold-rolled to yield strengths ranging from 194,000 to 278,000 psi. The environmental stress-corrosion studies were conducted with bent-beam and U-bend specimens, with the bent-beam specimens stressed to 75% of the yield strength. Significant failures were observed with the Ladish D6AC, Type 300M, and Vascojet 1000 alloy steels in the environments of distilled water, tap water, salt water, and high humidity. The Vascojet 1000 alloy was the most susceptible to stress-corrosion failure. No failures were observed with any of the other environments or alloys tested. (Author)

AD-264 675 Div. 17
(TIPSM/BRW) OTS price $1.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Bi-monthly progress rept. no. 5, 2 July-1 Sep 61, by G. E. Spangler, E. J. Arndt, and M. Herman. 1 Sep 61, 7p. incl illus. (Report no. P-A2476-5)
(Contract NOw 61-0221-d)
Unclassified report

DESCRIPTORS: (*Beryllium, Preparation, Purification, Castings, Extrusion, Zone melting, Deformation, Fracture (Mechanics).) (Mechanical properties, Tensile properties, Stresses, Shear stresses, Crystal structure.) (Single crystals, Deformation, Crystallization, Grains (Metallurgy), X-ray diffraction analysis.) Metals.

Attempts were made to prepare high purity Be and to study its deformation and fracture characteristics. Zone melting was applied of a 1-in.-diam Pechiney Be bar prepared by hot extrusion of H. P. grade powder. After 3 zone passes the dross was excessive and could not be removed readily. Four zone passes were made through a Brush vacuum cast 1-in.-diam. bar. Ten zone passes will be made prior to the evaluation of its properties. Zone melting of higher purity starting material was also carried out on 1/4-in.-diam. bars of vacuum distilled e (Nuclear Metals Inc.) and a bar of SR grade Pechiney Be. Single crystals of zone-refined Be were hot rolled and subsequently recrystallized; highly oriented structures were obtained. Crude bend tests were performed on the polycrystalline material. One sample underwent a 60-deg bend producing a 10% strain in the outer fibers.

AD-264 685 Div. 17, 26, 1
(TIPSM/REB) OTS price $13.00

General Dynamics/Convair, San Diego, Calif.
TITANIUM DEVELOPMENT PROGRAM. VOLUME IV.

Division 17 - METALLURGY

Final technical engineering rept. vol. 4, Dec 57-May 61,
by A. P. Langlois, J. F. Murphy, and E. D. Green.
May 61, 168p. incl. illus. table.
(Contract AF 33(600)34870)
(ASD TR 61-7-576) Unclassified report

DESCRIPTORS: (*Airframes, Materials, *Alloys, *Titanium alloys, *Manufacturing methods, Tools, *Joints.) (Tails, Wings, Control surfaces, Fuselages, Airplane engine ducts, Airplane panels, Stiffened cylinders, Design, Configuration.) (Joints, Bolted joints, Riveted joints, Welding, Welded joints, Brazing, Spot welds.) (Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (Processing, Chemical milling, Heat treatment.)

Contents:
Manufacturing method development
Development of optimum operational sequencing
Process development
Chemical milling
Tooling concepts
Room temperature form - furnace hot size and age
Room temperature form - heated press hot size-furnace age
Short cycle hot form - age sequence
Tool materials
Parts manufacture
Tail cone
Leading edge
Canted fuselage bulkhead assemblies
Engine bleed air ducts
Panels

AD-264 691 Div. 17, 26, 1
(TIPSM/BRW) OTS price $19.75

Chance Vought Aircraft, Dallas, Tex.
STEEL AIRCRAFT CASTINGS.
Final technical engineering rept., Oct 57-June 61,
by Y. J. Elizondo, C. T. Turner and others.
Aug 61, 297p. incl. illus. tables.
(Contract AF 33(600)36159, Proj. 7-630)
(ASD TR 61-7-630) Unclassified report

DESCRIPTORS: (Aircraft, *Airframes, Castings, *Steel castings, Processing, Manufacturing methods, Melting, Deoxidation, Degasification, Casting, Molding materials, Non-destructive testing, Heat treatment, Mechanical properties, Tensile properties, Surface properties, Tests.)

Alloy steels selected for environmental requirements of 600 and 900 F were modified to permit production of high strength, precision steel castings for aircraft. Strengths on the order of 200,000 psi at room temperature and 170,000 psi at 900 F. were obtained with one alloy, and 360,000 psi at room temperature and 245,000 psi at 600 F. with a second alloy. The modified alloys were AM-355 and 4340. (Author)

AD-264 696 Div. 17, 27, 26
(TIPSM/BRW) OTS price $6.60

General Electric Co., Cincinnati, Ohio.
ROLL FORMING TUNGSTEN ROCKET NOZZLES.
Final rept. on Development of High Strength Materials for Solid Rocket Motors,
by J. E. Japka. 17 Aug 61, 57p. incl. illus. tables.
(Contract NOrd-18119)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, *Tungsten, Manufacturing methods, Sheets, Deformation, Rolling mills.) (Metal plates, Configuration, Conical bodies, Preparation, Heat treatment, Deformation, Microstructure, Mechanical properties.) (Rocket motors, Guided missiles, Surface to surface, Underwater to surface.)

The roll forming process was applied to forming W into symmetrical nozzle shapes up to 12 in. in diameter with thin walls from 0.025 to 0.060 in. thick. Tungsten was used as the starting material in the form of rolled plate from 0.100 to 0.240 in. thick. The metallurgical characteristics of the W were investigated and material specified to suit the roll forming process. Mechanical properties of the starting material, intermediately formed parts, and the finished liners were investigated up to 5000 F. Tungsten was readily fabricated into thin walled nozzle shapes by roll forming cones to 75% deformation, and spinning these cones into nozzles. Its workability at 1800 F was very similar to mild steel at room temperature. Roll formed W nozzle liners had a fine grained heavily worked fibrous microstructure, with the greater amount of work in the axial direction. (Author)

AD-264 697 Div. 17, 26, 1
(TIPSM/REB) OTS price $21.00

General Dynamics/Convair, San Diego, Calif.
TITANIUM DEVELOPMENT PROGRAM. VOLUME V.
Final technical engineering rept., Dec 57-May 61,
by G. D. Lindeneau, D. H. Love and others.
31 May 61, 376p. incl. illus. tables.
(Contract AF 33(600)34876, Proj. 7-576)
(ASD TR 61-7-576, vol. 5)
Unclassified report

DESCRIPTORS: (*Titanium alloys, *Airframes, Materials, *Alloys, *Manufacturing methods.) (Airframes, Fuselages, Wings, Control surfaces, Airplane engine ducts, Tails, Airplane panels, Tests, Temperature, Pressure.) (Welding, Welded joints, Joints, Spot welds, Riveted joints, Brazing, Tests.) (Titanium alloys, Aluminum alloys, Molybdenum alloys.) (Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys.)

Typical airframe structures, fuselage frames, wing leading edge, bleed air ducts, tail cone, shear panels and compression panels of Ti-4Al-3Mo-1V and Ti-13V-11Cr-3Al were subjected to test loads in increasing increments of 100 degrees from room temperature to maximum temperatures of 800 and 900 F, depending on the part. Riveted and resistance welded construction was evaluated in the fuselage frame and wing leading edge. Other components were either fusion welded, resistance welded, riveted or brazed. Components were subjected to static and repeated loadings with the exception of compression panels which had axial and side loads supplied. All components satisfactorily withstood static test loads. Under repeated load test, the resistance welded fuselage frame and wing leading edge, although adequate, did not perform as well as the riveted versions. Repeated load tests of resistance welded shear panels showed marginal results. Other components performed satisfactorily under repeated load conditions. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-264 004 Div. 18
(TIPSM/EJH) OTS price $1.10

Hughes Aircraft Co., Fullerton, Calif.
FEASIBILITY AND DESIGN STUDY FOR COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM.
Monthly progress rept. 1 Aug-1 Sep 61,
by K. M. Spradlin. 21 Sep 61, 4p. incl. table.
(GSG rept. no. 1610.30/149; SD 61-159)
(Contract DA 18-108-cml-6618)
Unclassified report

DESCRIPTORS: (*Antiaircraft defense systems, *Shelters, *Portable shelters, *Air conditioning equipment, Particulate filters, Safety devices, Pneumatic devices.) (*Radar trailers, Trailers, Vehicles, Air conditioning equipment, Particulate filters, Safety devices, Installation.) (Biological warfare, Chemical warfare, Radiological warfare, Shelters, Portable shelters.) (Biological warfare agents, Bacterial aerosols, Chemical warfare agents, Aerosols, Poisonous gases, Radioactive isotopes, *Particulate filters, Shelters.)

Studies were directed toward determining space requirements for the CBR filter and the protective entrance stowage box for the following: Graham V-51 vans, AN/MPS-23 antenna trailers, GFE vehicles, GFE M-109 trucks, and GFE helihuts. Costs and cost estimates are included.

AD-264 430 Div. 18, 32
(TIPSB/LH) OTS price $1.60

Rand Corp., Santa Monica, Calif.
GLOSSARY OF TERMS ON NATIONAL SECURITY,
by S. M. Genensky and Olaf Helmer. Sep 61, 9p.
(Report no. RM-2754)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: (*Dictionaries, Handbooks, *National defense, Security classification, Warfare, Military operations, Military phychology, Interception probabilities.)

AD-264 521 Div. 18, 33
(TIPSB/CW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DEVELOPMENT OF RAILROAD TRANSPORTATION DURING THE SEVEN-YEAR PLAN,
by F. P. Mulyukin. 28 Aug 61, 29p. (Trans. no. MCL-1049 of Razvitiye Zheleznodorozhnogo Transporta V Semiletii, Sbornik Statey, Moskva, Transzheldorizdat, pp. 8-21, 1960)
Unclassified report

DESCRIPTORS: (*Transportation, *Railroads, *Cargo, *USSR, Economics, Growth, Distribution, Geography.) *Translations, *Technological intelligence.

AD-264 612 Div. 18, 17
(TIPSB/CW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF THE HEAT CORROSION RESISTANCE AND STRUCTURE OF A NUMBER OF IRON-BASE ALLOYS, RELATIVE TO THEIR COMPOSITIONS,
by S. D. Gertsriken, I. Ya. Dekhtyar, and L. M. Kumok. 28 Aug 61, 12p. (Trans. no. MCL-1026 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:259-267, 1960)
Unclassified report

DESCRIPTORS: (*Iron alloys, *Heat resistant alloys, *Corrosion-resistant alloys, Chemical properties, Microstructure, Welding, Tests.) (*Technological intelligence, *USSR.) *Translations.

The present paper is devoted to a search for new heat-resistant alloys based on iron and suited to long-term service at elevated temperatures as gas-turbine parts. Alloys (ingots of 0.3 - 0.5 kg) were prepared in an argon atmosphere in a high-frequency vacuum furnace, using pure metals. The alloys melted were subjected to an homogenizing anneal at 1200 degrees for 50 hrs, and were quenched in water from that temperature. They were then forged and rolled to 5 - 6 mm in the 950 - 1050 degree temperature interval. Investigations of the microstructure of the quenched specimens showed that alloys Nos. 1 - 5 containing 5% Al constituted a two-phase solid solution of the ferritic - austenitic type. The phase ratio in these alloys varied, and alloys Nos. 6-19 constituted single-phase solid alloys of the ferritic type. Weldability tests were performed on alloys Nos. 12 - 19, in the form of forged and rolled slabs 2 - 5 mm thick, 25 - 40 mm wide, and 70 to 100 - 120 mm long. The weldability tests provided for fusing beads to the surfaces of the plates and making one- and two- tee-joint fillet welds (the tees were made only of plates of 4 - 5 mm thickness). The fusing of the beads and welding of the tees were performed by inert gas shielded arc welding using a nonconsumable electrode with filler material. (Author)

AD-264 616 Div. 18, 1, 26
(TIPSB/LH) OTS price $18.00

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ASSEMBLY AND FITTING OPERATIONS (SELECTED PARTS) PART I,
by Ye. P. Shekunov, V. V. Boytsov and others. 15 Sep 61, 285p. incl. illus. tables. (Trans. no. MCL-819, pt. 1 of Gosudarstvennye Izdatel'stva Oboronnoy Promyshlennosti, Moskva, pp. 67-77, 95-97, 99-111, 121-178, 192-194, 201-204, 207-476, 1959)
Unclassified report

DESCRIPTORS: *Translations, *Technological intelligence, *USSR. (*Aircraft industry, *Manufacturing methods, Sandwich construction, Honeycomb cores, Metal joints, Riveted joints, Welded joints, Welding, Bonded joints.) (*Aircraft, Airplanes, *Construction.)

AD-264 625 Div. 18, 4
(TIPSB/LH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE DEIORNIZATION (DEIONIZING) OF WATER BY CELLULOSE,
by U. M. Kostrikin, I. N. Goffman, and V. A. Ivanova. 13 Sep 61, 15p. incl. illus. tables (Trans. no. MCL-1056 of Teploenergetika 3:13-17, 1960)
Unclassified report

DESCRIPTORS: (*Translations, *Technological intelligence, USSR.) (*Water, Purification, *Iron compounds, Separation, Cellulose, *Water filters.) Experimental data, Analysis.

Division 19 - NAVIGATION
Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-264 626 Div. 18, 12
(TIPSB/CCH) OTS price $14.50

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
FROM MAN-MADE SATELLITES TO INTERPLANETARY FLIGHTS (Ot Iskusstvennykh Sputnikov K Mekhplanetnym Poletam),
by A. Shternfel'd. 18 Sep 61, 210p. incl. illus. (Trans. no. MCL-1301 of Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury, Moskva, 203p., 1959)
Unclassified report

DESCRIPTORS: (*Satellites, Design, Manned, *Space flight, Training.) (*Orbital flight paths, Weightlessness, Take-off, Acceleration, Deceleration, Motion, Astronomical observatories.) Flight to Moon, Mars and Venus, Celestial navigation, *Technological intelligence, *Translations, USSR.

AD-264 630 Div. 18, 25
(TIPSB/CW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METHOD OF CALCULATING THE HYDRAULIC RESISTANCE IN PIPES ON PUMPING OF VISCOUS AND ELASTO-VISCO-PLASTIC PRODUCTS UNDER CONDITIONS OF HEAT EXCHANGE AND HIGH PRESSURE,
by A. K. Skryabin. 24 Aug 61, 31p. incl. illus. 12 refs. (Trans. no. MCL-994 of Fizicheskiye Protsessy i Osnovy Rascheta Teplokhimicheskikh Annaratov 24:107-125, 1958)
Unclassified report

DESCRIPTORS: (*Petroleum, *Hydraulic pressure pumps, Pipes, Viscosity, Fluid flow, Turbulent flow, Pressure, Heat exchangers, Heat transfer, Mathematical analysis.) (*Technological intelligence, USSR.) *Translations.

During the manufacture of synthetic liquid fuel, a coal-oil paste and a paste-gas mixture must be pumped through pipes and heat exchangers. As they flow under high pressure, this paste and this mixture are heated. This leads to a variation of the physical constants of the mixtures along the route, and in consequence the hydraulic resistance per linear meter also varies. Formulas for calculating the hydraulic resistance in pipes over the entire length of the route have been derived, allowing for the variation of the physical constants with the heating of the paste and the paste-gas mixture. (Author)

19. NAVIGATION

AD-264 286 Div. 19
(TIPSE/NTM) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
A NEW GUIDING AND TRACKING SYSTEM,
by Henry P. Kalmus. 20 Sep 61, 21p. incl. illus. (Rept. no. TR-974)
(DOFL Proj. 16100)
Unclassified report

DESCRIPTORS: (*Guidance, *Tracking, *Detection.) (Phase measurement, Phase detectors, Navigation.) (Bearing finding, Radio fields, Electromagnetic fields.)

A new application of the near-field theory is described which permits determination of the relative bearing of one object with respect to another by a simple phase measurement without an additional reference signal. The same instrument is used to measure distance between the objects. The angle indication is independent of distance. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-264 022 Div. 20
(TIPSB/LH) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ATTENUATION OF GAMMA RADIATION THROUGH TWO-LEGGED RECTANGULAR DUCTS AND SHELTER ENTRANCEWAYS. AN ANALYTICAL APPROACH,
by J. C. LeDoux and A. B. Chilton. 20 Jan 61, 50p. incl. illus. (Technical note no. TN-383)
Unclassified report

DESCRIPTORS: (*Radiation effects, *Gamma rays on, *Shelters, Attenuation, Determination, Mathematical analysis.)

An analytical approach is developed to permit determination of gamma radiation attenuation as it passes through two-legged rectangular ducts and shelter entranceways. The approach used employs the albedo concept for wall scattering and includes correction terms necessary to account for the corner lip effect. With appropriate simplifying assumptions, moderately simple engineering formulas are obtained. Actual use of the formulas requires better knowledge of differential angular albedo than is presently available; however, by assuming isotropic distribution of the albedo function, a very good comparison of experimental information with results calculated by this technique is obtained. (Author)

AD-264 050 Div. 20, 14
(TIPSM/SEB) OTS price $5.60

Radiation Effects Information Center, Columbus, Ohio.
RADIATION EFFECTS STATE OF THE ART 1960-1961. 30 June 61, 52p. incl. illus. tables (REIC rept. no. 22)
(Contract AF 33(616)7375; Continuation of AF 33(616)6564)
Unclassified report

DESCRIPTORS: (*Radiation effects on Materials, Electronic equipment, Semiconductors, Polymers, Fluids, Lubricants, Hydraulic fluids, Physical properties, Mechanical properties of Metals, Alloys, Ceramic materials, Explosives, Propellants, Satellite vehicles, Spaceships.) (Space environmental conditions, Nuclear energy, Radiation effects, Measurement, Dosimeters.) Research program administration.

A series of memoranda is presented summarizing briefly (1) the current state of the art, (2) programs in progress, and (3) Battelle's conclusions and recommendations in the following areas: electronic components and equipment; semiconductor devices and materials; polymeric materials; fluids, lubricants, and hydraulic fluids; structural metals and ceramic materials; space radiation; and dosimetry and units. The report is oriented around steady-state nuclear-radiation effects; however, considerations regarding the less well-defined areas of pulse radiation and space radiation are included. (Author)

AD-264 053 Div. 20, 32, 8, 7, 14, 17, 30
(TIPSB/CCH) OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 50.
Rept. for 1-31 Aug 61.
15 Sep 61, 21p. (REIC Accession list no. 50)
(Contract AF 33(616)7375; Continuation of Contract AF 33(616)6564)

Unclassified report

DESCRIPTORS: *Bibliography, *Radiation effects, Nuclear explosions, Electronic equipment, Electrical systems, Materials, Electronics, Polymers, Metals, Ceramic materials, Space environmental conditions, Dosimeters, Test facilities.

AD-264 130 Div. 20, 18
(TIPSP/WH) OTS price $8.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
RADIOLOGICAL DECONTAMINATION METHODS AND EQUIPMENT FOR COLD-WEATHER REGIONS,
by D. Taylor, E. N. Hellberg, and others.
27 Sep 61, 88p. incl. illus. tables.
(Technical rept. no. 105)

Unclassified report

DESCRIPTORS: (*Radioactive fall-out, *Decontamination, *Naval shore establishments, Artic regions.) Military operations. (Fire extinguishers, Fire pumps, Freezing point depressants.) (Radiological dosage, Climatic factors.)

The effects of cold weather upon the operation of the basic radiological recovery plan are pointed out; the major problem areas most likely to be encountered in recovering a fixed military installation subjected to radiological contamination in cold climatic conditions are outlined, and methods and equipment to be used for radiological decontamination are indicated and illustrated for various cold-weather conditions. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-263 919 Div. 22, 17, 25
(TIPSM/BRW) OTS price $3.60

Naval Weapons Plant, Washington, D. C.
THE SELECTION OF LOW-MAGNETIC ALLOYS FOR EOD TOOLS,
by Kenneth Kojola and William Lurie. 9 Aug 61, 34p. incl. tables (Rept. no. NWPW-T-3-61)
(NAVORD rept. no. 6971)

Unclassified report

DESCRIPTORS: (*Ordnance disposal tools, *Magnetic alloys, Instruction manuals, Alloys, Magnetic properties, Processing, Physical properties, Mechanical properties.) Aluminum alloys, Beryllium alloys, Brass, Bronze, Copper alloys, Cobalt alloys, Chromium alloys, Iron alloys, Magnesium alloys, Manganese alloys, Molybdenum alloys, Nickel alloys, Stainless steel, Silicon alloys, Tin alloys, Titanium alloys, Tungsten alloys, Zinc alloys.

The basic purpose of the document is to serve as a guide to design engineers, project engineers, and contractors to aid in the selection and processing of metallic materials for use in various explosive ordnance disposal (EOD) tools and equipment. Materials for such uses are selected primarily because of their ability to comply with low-magnetic property requirements. Additionally, strength properties are important in selecting materials for specific requirements. This manual will therefore include information on (1) the magnetic properties of currently acceptable materials, (2) other physical and mechanical properties and (3) processing information on these materials. (Author)

AD-264 020 Div. 22
(TIPSM/EJH) OTS price $4.60

Miller Research Labs., Baltimore, Md.
PRODUCTION ENGINEERING OF PLASTIC COMPONENTS FOR CARTRIDGE, 81 mm, ILLUMINATING T214E2.
Rept. of engineering study,
by E. R. Briggeman. 16 Aug 61, 27p. incl. illus.
(Rept. no. 251-101)
(Contract DA 36-034-ORD-3468)

Unclassified report

DESCRIPTORS: (*Cartridges, *Illuminating projectiles, Parachute flares, Pyrotechnics, Smoke generators.) (*Cartridges, Cartridge cases, Design, Configuration, Materials, Aluminum, Phenolic resins, Plastics, Manufacturing methods of Production, Extrusion, Molding, Ballistics, Mechanical properties, Tests.)

TAIL CONE: It is recommended that the tail cone be fabricated in 7075T6 aluminum as an impact extrusion in accordance with MRL Drwg. 251C10001. Modifications are as follows: The threaded stud will be formed as integral part of extrusion; The mating length of tail cone and candle case has been reduced from 1.220 to 1.000; Wall thickness has been reduced from 0.301 to 0.238; and Inside diameter has been increased. CANDLE CASE: It is recommended that the candle case be fabricated in phenolic resin, with cellulose filler as a compression molded part in accordance with MRL Drwg. 251C10001. ASSEMBLY OF CANDLE CASE: It is recommended that the candle case and tail cone be assembled with shear pins alone. (Author)

Division 23 - PERSONNEL AND TRAINING

AD-264 176 Div. 22, 25
(TIPSB/LH) OTS price $3.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
RESEARCH PROGRAM ON CONVERSION OF EXPLOSIVE ENERGY.
Quarterly progress rept., Jan-Mar 61,
by S. J. Lukasik. Mar 61, 37p. incl. illus. tables.
(Contract DA 28-017-501-ORD-3450)
Unclassified report

DESCRIPTORS: (*Explosives, *Detonation, Gases, Magnetic fields, Energy, Electrical effects, Electrical properties, Conductivity, Resistance, Measurement.) (Tests, Test equipment, Calibration, Capacitors, Vacuum systems, Mathematical analysis.)

Efforts have been largely directed toward the analysis of existing data and the construction of equipment for future work. Some of the measured conductivity values have been revised in the light of more complete probe calibration data. A complete tabulation of conductivity probe characteristics is included. New results have consisted of a careful study of the conductivity circuit rise time and the effect of signal cable length and circuit parameters on the observed signal. This has resulted in a considerably greater confidence in the reported conductivity values. However, it has also indicated that the observed signal cannot be interpreted so closely as to yield detailed information on the structure of the reaction zone. (Author)

AD-264 320 Div. 22
(TIPSE/NTM) OTS price $1.60

General Technology Corp., Elgin, Ill.
THE DEFORMATION OF FILLED SHELLS DURING FIRING.
Rept. on Research and Development Study on Stress-Strain Characteristics of Shells and High Explosives,
by R. C. Geldmacher and T. M. Roach, Jr. July 61, 17p. incl. illus. table (Technical rept. no. 1-18)
(Contract DA 11-022-501-ORD-2917, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: Deformation, *Explosives, Stresses, Measurement, *High explosive ammunition, Mechanical properties, *Projectiles, Rotating bands.

For fillers of the kinds so far studied (PBX simulant, inert filler D) no significant shell support is given by the filler in the vicinity of the rotating band in usual shell designs. This appears to be due largely to the facts that for fitted fillers the clearances required are on the order of the shell deflections and for poured fillers the shrinkage during casting is considerably greater than shell deflections. It appears that shell walls provide very little axial constraint to the filler. Therefore if the significant mechanical properties of a filler are known, a valid analysis of filler behavior should result from assuming the filler to be supported and accelerated by force transmitted through the base of the shell. Measurements can be satisfactorily made of strains in shells undergoing acceleration associated with muzzle velocities on the order of 1500 feet per second. (Author)

AD-264 452 Div. 22
(TIPSB/LH) OTS price $1.60

Springfield Armory, Mass.
BIBLIOGRAPHY OF SPRINGFIELD ARMORY REPORTS (1 JULY 1959-31 DECEMBER 1960) TECHNICAL, MEMORANDUM, AND NOTES ON MATERIEL.
16 Feb 61, 10p. (Rept. no. SA-TR20-9101)
Unclassified report

DESCRIPTORS: (*Bibliography, *Scientific reports, Materials, *Ordnance, Guns, Test methods, Engineering.)

This bibliography contains a listing of Springfield Armory reports - technical, memorandum, notes on materiel - published from 1 July 1959 to 31 December 1960. Springfield Armory has made initial distribution of the reports in this bibliography. Reports published from 1 January 1948 to 30 June 1959 are listed in SA-TR20-9100 dated 30 September 1959. (Author)

AD-264 549 Div. 22
(TIPSE/CDM) OTS price $1.60

Albion Malleable Iron Co., Mich.
WARHEAD FOR ROCKET, BOOSTED, 115mm, HE, XM-54.
Progress rept. no. 18, 1-31 Aug 61.
8 Sep 61, 16p. incl. tables.
(Contracts DA 20-018-501-ORD-272 and DA 20-108-ORD-23766)
Unclassified report

DESCRIPTORS: (*Rocket heads, *Warheads, High explosive ammunition, Production, Design.) (Boosters, *Rockets.)

Work was continued on the warheads for the 115-mm boosted rockets. A new design of the base plug was made. A few sample castings were made and checked. After the pattern was revised, a production order was run. Some of these have been machined and shipped out.

23. PERSONNEL AND TRAINING

AD-263 915 Div. 23
(TIPSB/LH) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
THE VALIDITY OF THE OFFICER-LIKE-QUALITY MEASURES USED IN THE U. S. NAVAL SCHOOL, PRE-FLIGHT,
by R. E. Doll and J. R. Berkshire. 20 June 61, 5p. incl. table (Special rept. no. 61-6)
Unclassified report

DESCRIPTORS: (*Naval personnel, *Aviation personnel, *Aptitude tests, Selection, Officer personnel, Effectiveness.)

The purpose of this investigation was to determine the relative validities of the components of the pre-flight officer-like-quality grade (OLQ) and the weights which, when applied to these components, would yield the most valid composite grade. The current procedure of using

plus and minus factors for cadet rank, activities, and demerits makes the OLQ grade less accurate as a predictor of subsequent attrition. Weightings of .4, .2, .4 for average peer rating, average instructor rating, and average military rating, respectively, would increase the validity of the OLQ grade. The average OLQ grade should not be modified by addition or subtraction for cadet rank, activities, and demerits. (Author)

AD-263 916 Div. 23
(TIPSB/LH) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
IMPROVING THE PREDICTIVE EFFECTIVENESS OF PEER RATINGS.
by R. E. Doll and A. A. Longo. 14 July 61, 6p. incl. illus. tables (Special rept. no. 61-7)
Unclassified report

DESCRIPTORS: (*Naval personnel, *Aviation personnel, Personality, Sociology, Tests.) (*Selection, Effectiveness, Errors.)

Low scores on peer ratings of leadership potential have been shown to predict failure to complete the Naval Air Training Program. It is hypothesized here, however, that low peer ratings awarded by reason of anti-social personality traits are invalid as predictors of training failure and that the predictiveness of low peer ratings would be improved by removing such cases from the sample. Of 278 low-rated cadets, 73 were identified as having been low-rated for anti-social reasons. There were significantly fewer failures to complete training among these men than among men who were low-rated for other reasons. On the basis of these findings it is recommended that any administrator utilizing a student's low peer rating score as an aid in deciding his probability of successfully completing the flight program consider the reasons given for the low rating. (Author)

AD-263 917 Div. 23
(TIPSB/LH) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
THE RELATIONSHIP OF PRE-FLIGHT SCHOOL GRADES TO SUCCESS IN THE FLEET,
by J. R. Berkshire and R. W. Shoenberger.
14 July 61, 3p. incl. tables (Special rept. 61-8)
Unclassified report

DESCRIPTORS: (*Naval personnel, *Aviation personnel, Officer personnel, *Aptitude tests, Tests, *Effectiveness.)

The data contained in this report show that there is a definite relationship between fleet success, both as a pilot and as an officer, and performance in preflight school courses. (Author)

AD-264 435 Div. 23
(TIPSB/LH) OTS price $3.00

Republic Aviation Corp., Farmingdale, N. Y.
METHODS FOR COMPUTING MANPOWER REQUIREMENTS FOR WEAPON SYSTEMS UNDER DEVELOPMENT,
by John E. Losee, Gus E. Payfer and others.
Aug 61, 163p. incl. illus.
(Contract AF 33(616)6978)
(ASD TR 61-361) Unclassified report

DESCRIPTORS: (*Management engineering, *Personnel, Mathematical prediction, Industrial production, Production, Weapons.)

A method has been developed for an accurate and comprehensive forecasting of manpower requirements for new weapon systems. The manning estimate is developed through a series of integrated steps leading to position descriptions and numbers of men required. Early training information is obtained directly from Task Equipment Analyses; information covering ground support and other equipment, spares and consumables is obtained as a by-product. Plans are presented for an approximation of the effect of environment upon manning requirements, for the determination of manhours required for work of a type not amenable to direct task analysis, and for the estimation of maintenance activity frequency rates. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-264 061 Div. 24, 4
(TIPSM/SEB) OTS price $6.60

Technical Operations, Inc., Burlington, Mass.
INVESTIGATIONS ON EXTENDING THE SENSITIVITY RANGE OF SINGLE CRYSTALS AND EVAPORATED FILMS OF SILVER BROMIDE,
by Gershon M. Goldberg, John G. Pack and others.
Aug 61, 53p. incl. illus. tables, 10 refs. (Rept. no. TO-B 61-37)
(Contract AF 33(616)6992, Proj. 6272; Continuation of Contract AF 33(616)6071)
(ASD Technical rept. no. 61-332)
Unclassified report

DESCRIPTORS: (Photosensitivity of *Silver compounds, *Bromides, Crystals, Thin films.) (Crystals, *Single crystals, Preparation, Production, Purification.) (Films, *Photographic film, Preparation, Evaporation.) (Cameras, Design.) (Photographic chemicals, Design of Photography, Processing.) (Silver compounds, Bromides, Sensitivity to Dyes and Ions of Copper, Ammonia, Amines, Glycols.) (Silver compounds, Iodides.) Tests.

Two methods for achieving panchromatic sensitivity in single crystals and evaporated films of AgBr were investigated. The use of conventional photographic sensitizing dyes proved profitable. Over-all sensitivities obtained with evaporated films were of the order of ASA 1. Sensitivity to light passing a Wratten 25 filter was of the order of 0.01. With single crystals, sensitivities obtained were lower by a factor of 10. Methods were developed for scaling up of procedures to allow preparation of larger amounts of pure AgBr and larger amounts of evaporated film. A developer particularly suited for use with single crystals and evaporated films was formulated. Some additional chemical sensitization procedures and an improved transfer method were studied. An improved resolution camera was set up and is being modified. (Author)

AD-264 623 Div. 24, 2
(TIPSP/GRW) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
TEST FOR DETERMINING RESOLVING POWER FROM AERIAL

Division 24 - PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

PHOTOGRAPHS,
by P. B. Zakharov. 20 Sep 61, 28p. incl. tables. (Trans. no. MCL-1236 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Geodeziya I Aerofotos'yemka 6:121-132, 1960)

Unclassified report

DESCRIPTORS: (*Geodesics, *Aerial photography.) (*Aerial photographs, *Photographic film, Optical images, Sensitivity.) (Microphotography, Photographic lenses, Photosensitivity, Tests.) (Translations, USSR.)

Contents:
Tests for determining resolving power from aerial photographs
Determination of practical resolving power
Resolving power obtained from aerial photographs
Experimental work performed by the chair for aerial surveying, for the determination of resolving power by means of aerial photographs
Analysis of results of aerial test photography
Aerial camera MK with Ryssar 29 objective f 70 cm

AD-264 683 Div. 24
(TIPSE/DLW) OTS price $1.60

Link Div., General Precision, Inc., Palo Alto, Calif.
BALLISTIC CAMERA SYNCHRONIZATION AND CONTROL SYSTEM.
Progress rept. no. 6, 1-30 Sep 61. 15 Oct 61, 10p. incl. illus.
(Contract DA 30-069-ORD-3291)

Unclassified report

DESCRIPTORS: (*Ballistic cameras, Control systems, Synchronizers, Camera shutters, Timing circuits, Delay elements, Pulse generators, Circuits, Time delay relays, Electric filters, Synchros, Design, Tests.) (Optical tracking, Cameras, Photographic equipment, Servo systems, Switching circuits, Design.)

The camera shutter detector, time base generator, precision delay circuit, pulse generator, and one millisecond delay circuits were checked out. The redesigned G-4 averaging circuit is described. (Author)

25. PHYSICS

AD-263 914 Div. 25, 4, 8, 14
(TIPSM/EJH) OTS price $5.60

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept. for Apr-June 61.
1 Sep 61, 75p. incl. illus. tables.
(NAVWEPS rept. no. 7190) Unclassified report

DESCRIPTORS: (*Heat resistant polymers, *Polymers, *Phosphines, *Phosphorus compounds, Nitrogen compounds, High temperature research, Synthesis, Chemical reactions.) (Fluorides, Propyl radicals, Phosphines, Nitrilo radicals.) (Phenyl radicals, Phosphines, Nitrilo radicals.) (*Phosphonitrile chlorides, Heterocyclic compounds, Molecular structure.) (*Infrared spectroscopy, Interferometers, Standardization.) (Tin, Tin compounds, Iodides, Atomic spectrum, Atomic energy levels.) (Neon, Iodides, Atomic spectrum, Atomic energy levels.) Quantum mechanics, *Semiconductors, *Indium compounds, *Antimonides, *Semiconducting films, Photoconductivity, Bolometers, Thermal conductivity.

Contents: HIGH TEMPERATURE POLYMER PROGRAM: Preparation of Phosphonitriles from Phosphinous Amides, by G. Tesi and C. M. Douglas; Substitution Reactions of the Trimeric P-N System, by P. J. Slota, Jr. INFRARED ATOMIC SPECTRA: by C. J. Humphreys, E. Paul, Jr., and K. B. Adams: Direct Observations of Spectra; Interferometric Measurements; Interferometric Observations of Ne I; New Experimental Developments. MAGNETIZATION REVERSAL STUDIES: Spin Wave Scattering, by R. L. Conger. SEMICONDUCTOR PHYSICS: Bolometer and Photoconductive Effects on InSb Films, by H. Piller, D. C. Arrington, and J. W. Holm-Kennedy.

AD-263 967 Div. 25, 26
(TIPSM/EJH) OTS price $1.60

TYCO, Inc., Waltham, Mass.
THE TRAVELLING SOLVENT METHOD OF CRYSTAL GROWTH.
Quarterly rept. no. 1, 15 May-15 Aug 61,
by A. I. Mlavsky. 17 Aug 61, 5p. incl. illus.
(Contract AF 19(604)8803)
(AFCRL-752) Unclassified report

DESCRIPTORS: (*Gallium compounds, *Arsenides, *Arsenic compounds, *Intermetallic compounds, Gallium, Solvent action, Temperature, Reaction kinetics, *Crystals, Single crystals, Growth, Preparation.) Laboratory equipment, Sandwich construction.

Initial studies were made of the dissolution rate of GaAs in Ga as a function of temperature. Additional experiments were performed to investigate the effect of crystal orientation of the dissolution rate. A small flat disc of polycrystalline GaAs was held by suction onto a ground face of a quartz tube and then immersed in Ga at a series of increasing temperatures. It was established that the amount dissolved at any given temperature increased linearly with time. A marked preferential etching of polycrystalline GaAs by Ga was noted. After etching a single crystal sphere in Ga at 550 C and removing surplus Ga by etching in HCl solution, it was observed that the sphere developed a number of inchoate facets which were not quite flat. A subsequent etch at higher temperature removed all evidence of facet development. (Author)

AD-263 969 Div. 25
(TIPSM/RRW) OTS price $6.60

Watervliet Arsenal, N. Y.
TRANSFER OF FORCE BY HIGH-STRENGTH FLAKES IN A COMPOSITE MATERIAL,
by M. A. Sadowsky. June 61, 65p. incl. illus.
(Technical rept. no. WVT RR 6105-R)
(Proj. no. DA 59901004)
Unclassified report

DESCRIPTORS: (*Mechanics, Reinforcing materials, Filaments, Fibers, Bonding, Mechanical properties, Shear stresses, Elasticity, Mathematical analysis.)

Isolated microfibers and isolated microflakes do not contribute to strengthening of the composite material. Stress concentrations arising at the ends of isolated microelements will easily reach proportions threatening to destroy the surface bond between microelement and matrix. Whenever this happens the end portions of the microelements become totally inactive. The same kind of inefficiency is inherent in a sequence of microelements aligned along a common line (plane). Such arrangements will not help to build a strong composite material. It was intuitionally recognized, and has now been confirmed by mathematical elasticity analysis that the basis of strength of the composite lies in the staggered arrangement as shown in illustrations in the report and in force transfer by means of shearing stresses. (Author)

AD-264 010 Div. 25, 12
(TIPSP/WH) OTS price $4.60

Land Air, Inc., Point Mugu, Calif.
DETERMINATION OF THE ORBIT FROM INITIAL CONDITIONS,
by P. Meehan. 5 Sep 61, 43p. incl. illus.
(Rept. no. 31)
(Contract N-123(61756)19425A/PMR)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Satellite vehicle trajectories, Orbital flight paths, Determination.) (*Celestial mechanics, Equations of Motion, Mathematical analysis, Partial differential equations, Transformations (Mathematics), Digital computers.)

The classical equations that define the trajectory of an object moving under a central force are developed. The derivation proceeds from first principles to produce a computer oriented method for reducing satellite data. The circular, elliptic, parabolic, and hyperbolic cases are considered and conventions are established where necessary. The method includes the determination of the orbital elements and the determination of the predicted space position and velocity for arbitrary time. Transformations are included to carry these values to rotating geocentric coordinates; local tangent plane; or azimuth, elevation, and slant range for arbitrary locations on earth. (Author)

AD-264 025 Div. 25, 12
(TIPSP/WH) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
SURFACE-TEMPERATURE DISTRIBUTION OF THIN-WALLED BODIES SUBJECTED TO SOLAR RADIATION IN INTERPLANETARY SPACE,

by Lester D. Nichols. Oct 61, 48p. incl. illus. tables (Technical note D-584)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-584.

DESCRIPTORS: (*Thermal radiation of Sun, *Spaceships, Spheres, Conical bodies, Cylindrical bodies, Heat transfer, Thermal conductivity.) (Satellite vehicles, Rotation, Cooling.) (Determination of *Surface temperature of Spaceships.)

Temperature distributions on thin-walled spheres, cones, and cylinders in an interplanetary space environment were determined. Included in the calculations is the effect of variations in the wall thermal conductivity, thickness, and surface radiation properties as well as variations in the significant geometrical parameters. The object of the calculations is to determine the effectiveness of variations of these quantities in controlling temperature distributions on these bodies. Other methods of controlling the temperature variations, such as body rotation and internal radiation, are considered. (Author)

AD-264 026 Div. 25, 12, 30
(TIPSP/WH) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
CHOOSING A SUITABLE SWEEP RATE FOR SINUSOIDAL VIBRATION TESTING,
by Neal Granick. Oct 61, 13p. incl. illus. table (Technical note D-709)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-709.

DESCRIPTORS: (*Guided missiles, Materials, *Failure (Mechanics) of Tests, Test methods, *Vibration, Vibration mechanics, Resonance.) (Materials, *Airframes, *Load distribution.) (Vibration, Sweep generators, Mechanics, Stresses.)

Frequency-sweep vibration tests generally are conducted with a sweep rate that varies directly with the test frequency. The object is to pass through every resonance in the frequency range in such a manner that equal times are spent in each resonant bandwidth. The underlying assumption is that the average Q (transmissibility) of the resonances may be considered the same through the entire frequency range of interest. It is argued that, in tests which employ a constant level of acceleration control, the average Q actually must increase with an increase in resonant frequency. Therefore, a suitable sweep rate must be one which changes with a fractional power of the test frequency, rather than with the first power. (Author)

AD-264 070 Div. 25, 2
(TIPSP/GRW) OTS price $4.60

Space Technology Labs., Inc., Los Angeles, Calif.
STUDY OF THE REFLECTING POWER OF THE MOON'S SURFACE,
by N. N. Sytinskaya and V. V. Sharonov. May 61, 43p. incl. illus. tables (Rept. no. STL-TR 61-5110-23, Trans. from Uchenye Zapiski Lgu, No. 153, 114 1952)
Unclassified report

DESCRIPTORS: (*Moon, *Reflection by Light, Brightness, Tables, Measurement by Photometers.) (Terrain, Surface properties.)

AD-264 127 Div. 25, 12
(TIPSM/REB) OTS price $13.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMAL RADIATIVE CONTROL SURFACES FOR SPACECRAFT,
by Roger E. Gaumer and Louis A. McKellar. Mar 61, 198p. incl. illus. tables, 245 refs. (Rept. no. LMSD-704014)
(Contracts AF 04(647)563, AF 04(647)564 and AF 04(647)558)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, Airframes, Surfaces, Stnuctural shells, Materials, Surface properties, *Thermal radiation.) (Thermal radiation, Infrared radiation, Ultraviolet radiation, Solar energy, Heat transfer, Measurement, Theory.) (Aerodynamic heating, Space environmental conditions, Re-entry aerodynamics, Atmosphere entry.) (Materials, Ceramic coatings, Coatings, Adhesives, Metals, Metal coatings, Paints, Resins, Heat resistant paints, Refractory materials, Plastics.) (*Bibliography on Infrared radiation, Design of Satellite vehicles, Space environmental conditions, Thermal radiation, Solar cells, Optical materials, Ablation.) (Bibliography, Research program administration of Satellite vehicles, Materials.) Radiation effects, Temperature control.

A program is described which was initiated in support of the Discoverer and Midas satellite programs to find or develop surface materials for spacecraft thermal control. The report summarizes the basic problems of spacecraft thermal control, delineates current problem areas, and reviews the experimental and development work directed toward solution of these problems. The following areas of investigation are discussed: (1) measurement of radiation characteristics, i.e., solar absorptance in infrared emittance; (2) determination of the effects of the environment on radiation characteristics of the surfaces of interest; and (3) present state of programs to develop stable surface materials for spacecraft use. (Author)

AD-264 136 Div. 25, 19, 20
(TIPSP/WH) OTS price $5.60

Coordinated Science Lab., U. of Illinois, Urbana.
(No title).
Progress rept. for June-Aug 61.
Aug 61, 49p. incl. illus.
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: (*Gyroscopes, Inertial navigation, Spheres, Beryllium.) (Physics, *Vacuum systems, Plasma physics, Electrons, Molecules, Helium.) (*Secondary emission, Gold, Molybdenum.) (*Electrons, Diffraction, Crystals, Germanium.) (*Nuclear resonance, Fluorescence, Copper.) (*Analog computers, Digital computers, Transistors, Computer logic, Programming.) (*Plasma physics, *Delay lines.)

Eight gyro test runs were performed, three with the beryllium rotor described and five with an aluminum rotor which had a helium leak. These tests were conducted in connection with a gimballed high precision inertial navigation instrument employing a spherical metal rotor supported without physical contact in ultra-high vacuum by servo controlled electric fields. Investigations in basic physics concerned: ultra-high vacuum, electron-electron interaction in a plasma, charge and excitation exchange processes, time of flight spectrometer, optical pumping of surfaces, plasma beam experiment, surface kinetics, electron dif-

fraction, Mossbauer effect on Cu and Mo surfaces, auger electron ejection, and vacuum breakdown. Work in the computer group concerned: equipment, multi-aperture device studies, transistorized digital analog computer, plasma delay line, CSL computer, programming, control data 1604 computer, air traffic control studies, and Boltzmann equation solution. (Author)

AD-264 143 Div. 25, 4
(TIPSM/REB) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
EQUILIBRIA IN GROUP III-V SEMICONDUCTORS CONTAINING GROUP IV SUBSTITUENTS,
by Allen B. Scott. 12 June 61, 38p. incl. illus. tables, 40 refs. (Scientific rept. no. 1)
(Contract AF 19(604)7231)
(AFCRL-772) Unclassified report

DESCRIPTORS: (*Semiconductors, *Intermetallic compounds, Phase studies, Electrical properties, Crystal structure, Lattices, Chemical bonds, Energy, Chemical impurities, Thermodynamics.) (Semiconductors, Indium compounds, Gallium compounds, Antimonides, Arsenides, Phosphides.) (Aluminum compounds, Antimonides.) (Chemical impurities, Silicon, Germanium, Tin, Lead, Ions, Ionization.)

A discussion is presented on the properties of Group IV substituents in Group III-V compounds. The electrical properties of GaSb with Sn as a substituent are calculated from thermodynamic considerations. The cases of a substituent as an acceptor or a donor, and of pair formation are considered. The general approach has been to calculate the free energy difference for substitution of a Group IV atom in a Group III and in a Group V site. (Author)

AD-264 148 Div. 25, 15
(TIPSP/MFA) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
DYNAMIC FORMS OF LOSS OF STABILITY OF AN ELASTIC SYSTEM,
by M. A. Lavrent'ev and A. Yu. Ishlinskii, tr. by R. M. Cooper. Aug 61, 7p. incl. illus. tables. (Rept. no. STL-TR 61-5110-41, Trans. from Doklady Akad. Nauk SSSR, 64:779-782, 1949)
Unclassified report

DESCRIPTORS: (*Dynamics of Structures, *Elasticity of Pitot tubes and Rods.) (Fluid mechanics, Pressure, *Motion, Axially symmetric flow, Harmonic oscillators.) (Equations, Differential equations, Polynomials, Integral equations, Matrix algebra.) (Vibration, Deformation, Plastic flow.) USSR, Translations.

A study is made of the dynamic behavior of fundamental forms which have been subjected to compression. It is determined that for loads exceeding the initial critical values suddenly applied to an elastic system, there results a motion after which the system does not return to its original state. If this function is harmonic the motion is a normal oscillation. Examples of these determinations are presented.

AD-264 155 Div. 25
(TIPSE/RD) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
OSCILLATION OF CURVE OF SUPERCONDUCTIVITY DESTRUCTION BY SONIC FREQUENCY CURRENTS AND ON SUPERCONDUCTIVITY AT A FREQUENCY OF 1.8 x 10,000,000,000 CYCLE/SEC,
by A. A. Galkin and B. G. Lazarev, tr. by Z. Jakubski. Mar 61, 9p. incl. illus. tables. (Rept. no. STL-TR 61-5110-11, Trans. from Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki, Tom 18, 1948)
Unclassified report

DESCRIPTORS: (Translations, USSR, Superconductivity, Technological intelligence.) (*Superconductivity of Tin, Reduction, Alternating current, Audiofrequency.) (Superconductivity, Tests.)

Oscillograms of destruction of superconductivity of tin by sonic frequency alternating currents (100 to 20,000 cycle per sec) were obtained. On the basis of these oscillograms, the upper time limit necessary for transition from the normal state to the superconducting one, or inversely, is determined. The length of the transition process was less than 2 x 10 to the minus 6th power sec. The velocity boundary propagation between normal and superconducting phases, the latter being higher than 1000 cm/sec, is evaluated. (Author)

AD-264 163 Div. 25
(TIPSP/WH) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
APPLICATION OF AN ELECTRICAL ANALOGY METHOD TO THE SOLUTION OF RADIANT HEAT EXCHANGE PROBLEMS,
by V. N. Adrianov, tr. by Z. Jakubski. Mar 61, 12p. incl. illus. (Rept. no. STL-TR 61-5110-8, Trans. from Izvestiya Akademii Nauk SSSR, Otn. Energetika i Avtomatika, No. 1, 1959)
Unclassified report

DESCRIPTORS: *Electrical networks, Circuits, Electrical properties, *Heat transfer, Thermal radiation, Diffusion, Transport properties, Absorption, Scattering, Analysis, *Simulation, Analog systems.

It is shown that integral equations which describe the processes of radiant exchange in a closed body system filled with a ray-attenuating medium can be adequately approximated by a system of linear algebraic equations identical to a system of equations expressing the distribution of currents and voltages in a specified electric circuit. This electric circuit can be used as an analog in solving, with the help of electro-integrators, radiant exchange integral equations. (Author)

AD-264 172 Div. 25, 15, 8, 30
(TIPSP/MFA) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE THEORY OF LOCKING WITH A SMALL AMPLITUDE EXTERNAL FORCE,
by R. V. Khokhlov, tr. by Arthur R. Kraiman. Apr 61, 11p. incl. illus. (Rept. no. STL-TR 61-5110-33, Trans. from Doklady Akademii Nauk SSSR, 97:411-414, 1954)
Unclassified report

DESCRIPTORS: (Mathematical analysis, *Nonlinear systems, *Electronic equipment, Electronic circuits.) (Electron tubes, Electric fields, Harmonic oscillators, Capacitors, Generators, Synchronizers, Feedback, Amplifiers, Amplitude modulation.) (Translations, *USSR.) Theory, Non-linear differential equations.

A method of solving the problems concerned with the action of small external periodic forces on

self-oscillatory systems of the Thomson-type is presented. The exposition is carried out on an example of the simplest problems in this field - the problem of locking a self-oscillatory system with a small external sinusoidal force. The method of solution consists of a preliminary estimate of the order of smallness of the quantities entering into the abbreviated equations, an expansion of these equations with respect to the small parameter, and a solution of the equation already simplified in that way. (Author)

AD-264 180 Div. 25
(TIPSP/WH) OTS price $15.50

Theoretical Chemistry Lab., U. of Wisconsin, Madison.
THE ENERGY OF INTERACTION OF GROUND AND EXCITED STATE HYDROGEN ATOMS. PART II,
by Paul Edward Cade. 19 June 61, 231p. incl. tables, 221 refs. (WIS-AEC-30, series no. 3)
Unclassified report

DESCRIPTORS: (*Hydrogen, Atoms, *Atomic energy levels, Atomic orbitals, *Quantum mechanics, Molecular rotation.) (Nuclear physics, Tables.)

A comparative analysis is presented about several different types of molecular wave functions. The discussion is oriented towards the calculation of potential energy curves, that is, the electronic energy, over a wide range of internuclear separations and not only the small separations which are important in chemical bonding. (Author)

AD-264 228 Div. 25, 14
(TIPSM/BRW) OTS price $2.60

Atomics International, Canoga Park, Calif.
THERMAL PROPERTIES OF REFRACTORY MATERIALS.
Rept. for 1 Aug 60-31 July 61 on Materials Thermal Properties,
by J. A. Cape and R. E. Taylor. July 61, 22p. incl. illus. tables.
(Contract AF 33(616)6794, Proj. 4776)
(WADD TR 60-581, pt. 2)
Unclassified report

DESCRIPTORS: (*High temperature research, *Refractory materials, Ceramic materials, Heat transfer, Measurement.) (Tungsten compounds, Borides, Thermal diffusion.) (Uranium compounds, Silicides, Brittle materials, Specific heat, Electrical conductance.) (Titanium compounds, Zirconium compounds, Carbides, Thermal conductivity, Electrical conductance.) (Test facilities, Test methods, Test equipment, Induction heating, Vacuum furnaces, Optical instruments, Pyrometers.) (Rocket motor nozzles, Materials, Thermodynamics.)

Refinements in the transient thermal property apparatus are described. The apparatus was used to determine the thermal diffusivity of WB from about 1300 to 1600 C. The values increase from about 0.054 to 0.058. The techniques and apparatus for measuring the specific heat of brittle conductors by pulse heating are also described. Resistivity and specific heat data for uranium silicide of several compositions are reported. The resistivity and specific heat increased with increasing Si content. For uranium silicide containing 3.8% Si, the resistivity increased from 56 to 75 micro-ohm-cm between 0 and 750 C, and for uranium silicide containing 5.9% Si, the resistivity increased from 81 to 111 micro-ohm-cm between 0 and 800 C. The specific heat for the 3.8% Si material is given by C sup p equals 3.16 x T + 0.0412 cal/gm-degree C from 50 to 430 C, and for the 5.8 Si material, C between 0 and 16.1 x 10 to the -6th power, T + 0.0455 cal/gm- degree C from 50 to 715 C, where T is in degree C. The thermal conductivity of Ti C was measured over the temperature region 400 to 1200 C. (Author)

AD-264 234 Div. 25, 15, 2
(TIPSP/MFA) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
GENERALIZATIONS OF THE SAHA EQUATION,
by E. M. Dewan. May 61, 37p. incl. illus.
(Rept. no. AFCRL 42)
Unclassified report

DESCRIPTORS: (*Astronomy, *Plasma physics, Quantum mechanics.) (Thermodynamics, Temperature.) (Electromagnetic theory, *Electromagnetic waves, Particles, Energy, Ionization.) (Equations, *Partial differential equations, *Distribution theory, Probability, Groups (Mathematics), Algebra.)

With steady-state equilibrium assumed, a general expression relating ion densities to the radiation and particle energy distributions is obtained. This equation reduces to Saha's equation in the limit of thermal equilibrium and gives numerical results in good agreement with those obtained by others whose work is based on entirely different considerations. We find that under certain conditions we can expect results that differ enormously from those predicted by the Saha equation. (Author)

AD-264 258 Div. 25
(TIPSP/WH) OTS price $11.00

Ordnance Tank-Automotive Command, Detroit, Mich.
ANALYSIS OF HIGH VOLTAGE FLUOROSCOPY IN INDUSTRIAL APPLICATIONS,
by Otto Renius, Donald W. Bowman and others. Apr 61, 137p. incl. illus. tables (Rept. no. RR-40)
(Proj. 2210.4500.064)
Unclassified report

DESCRIPTORS: (*Fluoroscopes, *X-ray generators, Image intensifiers (Electronics), Optical systems, Industrial radiography.) (Metallurgy, *Metallurgical analysis, Steel, Aluminum, Welds.)

The factors involved in high voltage fluoroscopy were investigated with respect to industrial applications of steel and aluminum weld inspection. Various x-ray generators ranging from 50 KVP to 15 MEV were used in conjunction with electronic and electroluminescent methods of image intensification to provide the optimum in fluoroscopic viewing. Sensitivity limits are presented for fluoroscopic techniques of inspecting aluminum welds 3/32 inches to 3 inches thick and for steel welds 1/8 inches to 3 inches thick. Techniques are established which meet the inspection requirements with respect to cavities and linear porosity in both aluminum and steel weld sections. (Author)

AD-264 294 Div. 25, 15
(TIPSP/JDP) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE LORENTZ TRANSFORMATIONS VIEWED FROM A NEW

ANGLE,
by Edmond M. Dewan. Aug 61, 36p. incl. illus. 31 refs. (Rept. no. AFCRL 591)
(Proj. 5635)
Unclassified report

DESCRIPTORS: (*Relativity theory, *Transformations (Mathematics), Groups (Mathematics), *Learning.) (Light, Velocity, Mathematical analysis, Transformations (Mathematics), Learning.)

Special relativity is a subject which seems to defy common sense. The theory is presented from a new point of view as an attempt to help the reader acquire an understanding that relies not only on mathematical consistency but on consistency with common sense as well. The principle of relativity in the derivation of the Lorentz Transformations is replaced by three postulates which are directly connected with certain experiments; their epistemological and physical significance is then exposed. Gedanken experiments are employed to show that the apparent inconsistencies are actually non-contradictory from the points of view of all inertial observers. (Author)

AD-264 300 Div. 25, 2
(TIPSP/MFA) OTS price $6.60

Boeing Scientific Research Labs., Seattle, Wash.
RADIATION BELT PARTICLE ORBITS,
by Harold Liemohn. June 61, 56p. incl. illus. tables, 36 refs. (Rept. no. D1-82-0116)
Unclassified report

Also available from the author.

DESCRIPTORS: (*Particles in *Orbital flight paths of Exosphere.) (Theory of *Terrestrial magnetism, Electromagnetic fields, Motion, Gravity, Dipole moments.) (*Perturbation theory, Functions, Equations, Integrals, Geometry.) Tables.

The first-order theory of radiation belt particle orbits is reviewed. Certain general characteristics of the radiation belts, the exosphere, and the geomagnetic field which are important in orbit calculations are discussed. The equations for charged particle orbits in slowly varying magnetic fields are developed from elementary principles. These results are applied to particle motion in the geomagnetic field. The orbit equations and related parameters are derived for the geomagnetic dipole model. The values of the orbit integrals for the dipole case are given in tabular and graphical form. (Author)

AD-264 303 Div. 25, 17, 4
(TIPSM/SEB) OTS price $3.60

Eagle-Picher Research Labs., Miami, Okla.
RESEARCH INVESTIGATIONS IN THE PHYSICAL CHEMISTRY AND METALLURGY OF SEMICONDUCTING MATERIALS.
Quarterly rept. no. 5, 15 May-15 Aug 61,
by K. E. Bean, R. J. Starks, and W. E. Medcalf. 15 Aug 61, 31p. incl. illus. tables.
(Contract DA 36-039-sc-85131)
Unclassified report

DESCRIPTORS: (*Semiconductors, Materials, *Boron compounds, Bromides, Preparation, Synthesis, Purification, Spectrographic analysis, Reduction by Hydrogen.) (Coatings of Boron, Films, Deposits on Electrodes, Filaments.) (*Boron, Crystals, *Single crystals, Growth.) (Impurities, Chemical impurities, Tungsten, Diffusion into Crystals.) (Semiconducting films, Boron, Preparation, Deposits on Aluminum compounds, Oxides.) (Carbon, Determination in Boron.) (Boron, Chemical properties, Physical properties, Electrical properties.)

An epitaxial film of B of controlled thickness was grown on a single crystal of B by the H reduction of BBr3. The deposit had the orientation of the substrate. The resistivity, as determined by the 4-point probe method, was 1.3 to 1.4 ohm-cm over an area of approximately 1 sq cm. The film was p-type as determined by the hot probe method. Polycrystalline B films were grown on alumina substrates, using the same procedure. P-n junctions were produced in B of single crystal or nearly single crystal structure by diffusion of W at 1350 C for a period of 12 hr. The determination of C in B by the Leco conductometric method as used in the determination of C in steel was studied further and improvements were made in the procedure and design of equipment. (Author)

AD-264 305 Div. 25, 20
(TIPSP/TL) OTS price $1.60

Florida U., Gainesville.
GAMMA RAY SCATTERING.
Final technical progress rept., 18 Jan 59-18 June 61,
by John A. Wethington, Jr., R. A. Karam, and C. A. Bisselle. 18 June 61, 18p. incl. illus. tables.
(Contract NOa(s) 59-6013-c)
Unclassified report

DESCRIPTORS: (*Gamma rays, Scattering, Attenuation.) (Ethylenes, Polymers, Lead, Shielding, Design, Density, Detectors, Intensity, Laminates.) (*Photoelectric effect (Gamma rays), Processing, Photons, Atomic number.) (Materials, Absorption.) (Powder metallurgy, Aluminum, Copper.) (X rays, Energy, Metals, Electrons, Theory, Pulse height analyzers.) Van de Graaff generators.

Results obtained with true photon spectra showed that shields made of polyethylene and lead were more effective than lead shields of equivalent surface density. The laminated shield was the best of the three combination shields. It was shown experimentally that it was not necessary to convert pulse-height data into photon spectra in order to obtain relative dose rates from various shields; consequently differential pulse-height analysis can be a powerful tool for shielding research. (Author)

AD-264 310 Div. 25
(TIPSM/SEB) OTS price $2.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF SEMICONDUCTING PROPERTIES OF II-VI COMPOUNDS.
Scientific rept. no. 1, 1 June-1 Aug 61,
by M. Aven and W. W. Piper. 25 Aug 61, 24p. incl. illus. 13 refs.
(Contract AF 19(604)8512)
(AFCRL-776) Unclassified report

DESCRIPTORS: (*Semiconductors, Crystals, *Single crystals, Growth, Electrical properties, Hall effect.) *Semiconducting films, Vapor plating, Electrical properties, Hall effect.) (Cadmium compounds, Sulfides.) Zinc compounds, Selenides.) (*Gold, *Copper, Gallium, Bromine, Impurities, Diffusion into Crystals.) (Zinc compounds, Tellurides with Cadmium compounds, Sulfides.)

The possibility of using Cu or Au as p-type dopants in CdS has been explored. Analytical techniques for determining the amount of total and the approximate proportion of uncompensated Cu in CdS have been developed. Investigation of different methods of producing uncompensated ZnSe has led to a novel technique of producing n-type ZnSe with fairly good transport properties. Structures consisting of epitaxial films of hexagonal n-type CdS on cubic p-type ZnTe single crystals have been studied with respect to their crystallographic and electrical properties. (Author)

AD-264 346 Div. 25, 17
(TIPSM/BRW) OTS price $.75

Michigan U., Ann Arbor.
EFFECT OF STATE OF STRESS ON THE FAILURE OF METALS AT VARIOUS TEMPERATURES,
Rept. for 1 Apr-31 Dec 60 on Solid States Research and Properties of Matter,
by S. K. Clark, R. M. Haythornthwaite, and D. R. Jenkins. Mar 61, 18p. incl. illus. table, 13 refs.
(Contract AF 33(616)6041, Proj. 7021)
(WADD TR 60-869) Unclassified report

DESCRIPTORS: (Metals, Fracture (Mechanics), Stresses, Mechanical properties, *Zinc alloys, Castings, *Cylindrical bodies, Structural shells, Elasticity, Plasticity, Deformation, Failure (Mechanics), Theory, Mathematical analysis, Tests.) (Test facilities, Test equipment, Tensile properties, Torque, Shear stresses, Hydrostatic pressure, Brittle materials, Transition temperature.)

The results of the research indicate that thin tubular specimens of cast Zamak-3 zinc alloy are brittle for some states of combined tension and torsion load and ductile for others. A testing temperature in the range -8 to 80 F appears to be permissible. General characteristics of a yield function in accord with plasticity theory are discussed. The experimental data for yielding and fracture are compared with the predictions of theory. The large degree of scatter in the data makes theoretical correlation difficult, but it appears that all the needed data can be obtained by use of the present apparatus with modifications. All data for yielding and failure under combined tension and torsion loading were obtained at a test temperature of 32 F. (Author)

AD-264 350 Div. 25
(TIPSP/TL) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
PROPAGATION OF PLANE ELECTROMAGNETIC WAVES THROUGH LOSSY DIELECTRIC MEDIA,
by L. L. Hill and T. Marshall. Aug 61, 19p. incl. illus. (Ballistic research rept. no. 32)
(NAVWEPS rept. no. 7311) Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Electromagnetic fields, *Magnetic fields, Propagation, *Dielectrics, Sheets, Reflection, Refractive index, Transmission, Conductivity, Theory.) (*Differential equations, Partial differential equations, Vector analysis.) (*Shock tubes, Velocity, Calibration, Hypervelocity vehicles, Hypersonics, Re-entry vehicles, Hypersonic flow, Measurement, Gas flow, Gas ionization, Electrical properties.)

*Starting with the electromagnetic field equations, the necessary formulae for describing the propagation of plane electromagnetic waves through a series of dielectric slabs are derived. The dielectrics are assumed homogeneous, isotropic and lossy. The results take the form of the amplitude reflection and transmission coefficients which are expressed in terms of the propagation constants of the various dielectrics. The special case of an unknown medium contained between two low-loss windows is considered. When the windows are designed to be half-wave plates, the reflection and transmission coefficients are considerably simplified. The complex conductivity is taken to be the fundamental quantity which describes the lossy materials. (Author)

AD-264 351 Div. 25
(TIPSE/CCD) OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-monthly rept. no. 2, 12 July-11 Sep 61,
by H. Dean Batha and Richard M. Drake. 21 Sep 61, 3p.
(Contract NOw-61-0676-c)
Unclassified report

DESCRIPTORS: (*Ceramic materials, *Single crystals, Mechanical properties, Lattices, Crystal structure, Growth, Measurement.) (Single crystals, Silicon compounds, Aluminum compounds, Carbides, Nitrides, Solids, Solutions.) (Temperature, High temperature research.)

The three-point bending apparatus for obtaining stress-strain curves is nearly complete. This will measure Poisson's Ratio, Young's Modulus, modulus of rupture and toughness for each crystal. Small crystals of a solid solution of aluminum nitride and silicon carbide have been grown and a furnace for experimenting with the growth of massive crystals from the vapor phase is being built. (Author)

AD-264 375 Div. 25, 4, 7, 17
(TIPSM/REB) OTS price $2.60

New York U. Coll. of Engineering, N. Y.
MATERIALS FOR THERMOELECTRIC GENERATORS.
Final rept.,
by E. Miller, F. Ermanis and I. Cadoff. July 61, 30p. incl. illus., 20 refs.
(Contract AF 19(604)3902)
(AFCRL-830) Unclassified report

DESCRIPTORS: (*Thermoelectricity, *Generators, *Power supplies, *Materials, *Semiconductors, Alloys, Intermetallic compounds, Single crystals, Electrical properties, Resistance, Hall effect, Electrical conductance, Thermal conductivity, Determination, Phase studies, Optics, Infrared spectroscopy, Absorption.) (*Cadmium compounds, *Zinc compounds, *Antimonides.) (Materials for Electric power production and Cooling.)

The solidification and electronic characteristics of CdSb, ZnSb, and alloys of the system Zn sub x Cd sub 1-x Sb were studied for application to thermoelectric devices. CdSb single crystals were prepared and pertinent electronic data were obtained. IR absorption in the (100) direction of single crystal samples of CdSb gave a value for the energy gap at room temperature for indirect transitions of 0.45 ev with a temperature variation of -6 x 10 to the -4th ev/degree K. From resistivity, Hall coefficient and Seebeck coefficient data the energy gap at 0 K was calcu-

lated to be 0.57 ev, the mobility ratio 0.9, and the whole effective mass was found to increase with temperature from 0.2 to 0.38 between 100 and 300 K. The conductivity was found to be anisotropic, the three principal conductivities being the ratio sigma 010:100:001 equals 1.45:1.09:1.00. The phase relations between ZnSb and CdSb also show metastable-stable reactions. In the metastable system the section Zn sub x Cd sub 1-x Sb shows a eutectic at about Zn0.1Cd0.9Sb. (Author)

AD-264 376 Div. 25
(TIPSM/BRW) OTS price $7.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
DISCONTINUITY STRESSES IN SHELLS. GENERAL MODEL,
by R. R. Meyer. 6 Mar 59, rev. 3 July 61,
73p. incl. illus. (Rept. no. SM-35652)
Unclassified report

DESCRIPTORS: (*Structural shells, Bodies of revolution, Spheres, Conical bodies, Cylindrical bodies, Load distribution, Moments, *Stresses, Deformation, Mathematical analysis, Differential equations, Integration.) (Structural shells, Membranes, Shear stresses, Moments, Stresses, Theory.) (Pressure vessels, Nozzles, Design.)

The general approach to the solution of discontinuity stresses in surfaces of revolution is presented. Expressions for the edge loads and displacements at a discontinuity point are derived for special cases of spheres, cones, and arbitrary shells of revolution. (Author)

AD-264 392 Div. 25, 15
(TIPSP/WH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
SOME NUCLEAR CALCULATIONS OF U-235-D2O GASEOUS-CORE CAVITY REACTORS.
by Robert G. Ragsdale and Robert E. Hyland.
Oct 61, 31p. incl. illus. tables (NASA Technical note no. D-475)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-475.

DESCRIPTORS: (*Uranium, *Reactor cores, Reactor fuels.) (Reactor moderators, Heavy water, Zirconium.) (Nuclear propulsion, Nuclear power plants, *Critical assemblies, Thermal utilization.) (Hydrogen, Gases.)

The results of a multigroup, diffusion theory study of spherical gaseous-core cavity reactors are presented. The reactor cavity of gaseous U235 is enclosed by a region of hydrogen gas and is separated from an external D2O moderator-reflector by a zirconium structural shell. Some cylindrical reactors are also investigated. (Author)

AD-264 394 Div. 25
(TIPSP/WH) OTS price $1.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
EFFECTS OF VIBNATION ON LAMINAR FORCED CONVECTION HEAT TRANSFEN IN A CONVENTIONAL COUNTERFLOW PLATE-FIN HEAT EXCHANGER.
Phase rept.,
by B. T. Plizak. 10 Aug 61, 11p. incl. illus. tables (Rept. no. NADC-EL-6148)
(Proj. no. ADC AV-44012)
Unclassified report

DESCRIPTORS: (*Heat exchangers, *Heat transfer, *Vibration, Ultrasonics.) (Electronic equipment, Cooling, Air cooled.) (Fins, Sheets, *Convection.)

A study was made on an avionics equipment plate-fin heat exchanger under varied conditions of sinusoidal vibration and laminar fluid flow conditions. This was done to determine the effects on over-all coefficients of heat transfer when hot and cold fluids were circulated simultaneously through the exchanger. (Author)

AD-264 398 Div. 25, 8, 15
(TIPSE/CCD) OTS price $2.60

New York U. Coll. of Engineering, N. Y.
RECTANGULAR TRANSFER MATRICES.
Scientific rept. no. 3,
by L. J. Kaplan and D. J. R. Stock. 5 June 61,
6p. (Technical rept. 400-39)
(Contract AF 19(604)7486)
(AFCRL 546) Unclassified report

DESCRIPTORS: *Matrix algebra, Functions, *Circuits, Theory.

A rectangular transfer matrix is developed for the n-port (n greater than or equal to 2) network. Considered is a device so used that a p-port is transformed into a q-port (p plus q equal to n). Its rectangular transfer matrix has all the interconnection properties of usual transfer matrices, providing the matrices multiplied are conformable (this can also be expressed in circuit terms). Standard tests for reciprocity and losslessness are shown to be applicable to the generalized transfer matrix. Finally, a new condition (for circuit theory) is given for pure gyrator networks. (Author)

AD-264 424 Div. 25
(TIPSP/MFA) OTS price $1.60

Rand Corp., Santa Monica, Calif.
THE HYPERSONIC TRAIL IN THE EXPANSION-CONDUCTION REGION,
by Paul S. Lykoudis. Aug 61, 13p. incl. illus.
(Rept. no. RM-2818-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: (*Re-entry vehicles, *Hypersonics of Velocity, *Axially symmetric flow, Gas flow, Shock waves.) (Re-entry aerodynamics, Thermodynamics, *Enthalpy, Heat, Pressure, Mach number.) (Theory, Equations, Integration, Integrals, Reynolds number.)

The normal procedure in calculating the cooling process in a wake behind a blunt object is to assume a region of pure expansion up to a distance where the pressure has reached its ambient value, followed by a region where the mechanism of heat conduction is operative. It is found that for typical re-entry conditions with high Reynolds numbers the two methods give the same result. However, for small bodies of the order of 1 cm, often used to simulate re-entry in a ballistic range, the differences may be large at high simulated altitudes. (Author)

Division 25-PHYSICS

AD-264 433 Div. 25
(TIPSE/RD) OTS price $3.60

David Sarnoff Research Center, Princeton, N. J.
INVESTIGATION OF CARRIER INJECTION ELECTRO-LUMINESCENCE.
Scientific rept. no. 2, 15 Apr-15 July 61,
by A. G. Fischer and A. S. Mason. 15 Aug 61,
27p. incl. illus. table.
(Contract AF 19(604)8018)
(AFCRL 721) Unclassified report

DESCRIPTORS: (*Luminescence, Solid state physics.) (Crystals, Growth, Zone melting.) (Zinc compounds with Selenides, Cadmium compounds with Sulfides.) (Zinc compounds with Tellurides, Gallium compounds with Phosphorus, Gallium compounds with Nitrogen.) (Glass, Arsenic, Bromine.) (Radiofrequency power, Control systems, Electronic circuits, Feedback.)

It was found that vertical crystal pulling of ZnSe and CdS is possible only in pressurized atmospheres of unsaturated vapors, since saturated vapors are too opaque to permit visibility. Several new systems for crystal growth under pressure are described, and a new feedback circuit for control of the RF generator has been invented. The properties of melt-grown ZnSe have been investigated, and an extensive survey of contacts to ZnSe was initiated. ZnSe and CdS form solid solutions, whereas CdS and ZnTe are immiscible. Materials which hold promise for the preparation of alloyed contacts have been found. Several single and multiple films with interesting properties have been obtained by evaporation, and an analysis of SCL hole currents in ZnSe has been carried out. It has been found that a glass consisting of As-S-Br is transparent from .5 to 13 microns GaP crystals have been prepared by vapor phase reaction starting from GaN. (Author)

AD-264 438 Div. 25, 8
(TIPSE/DLW) OTS price $4.60

David Sarnoff Research Center, Princeton, N. J.
HIGH TEMPERATURE SEMICONDUCTOR RESEARCH.
Scientific rept. no. 6, 1 Apr-30 June 61,
by J. Blanc, R. H. Bube and others. 31 July 61,
48p. incl. illus. tables.
(Contract AF 19(604)6152)
(AFCRL-740) Unclassified report

DESCRIPTORS: (*Semiconductors, Gallium compounds, Arsenides, Phosphides, Intermetallic compounds, Single crystals, Diodes, Thin films, Alloys, Chemical impurities, Electrical properties, Resistance, Measurement, Test equipment, Test methods, *High temperature research.) (Crystals, Quartz crystals, Growth, Preparation.)

Optical measurements on GaAs-GaP alloys disclosed a narrow transmission band at .065 ev. Attempts were carried out to grow GaAs single crystals in quartz and BN boats by the horizontal Bridgman technique using direct RF induction heating. A study of the GaAs-I2 system was started using u-v spectroscopic analysis of the vapor. Studies of impurity and non-stoichiometry effects in GaAs were continued. Unusual mobility effects in GaAs such as mobility killers and giant scattering cross sections are explained by generalizing the model of Gossick, Crawford, and Cleland. An energy level model is presented to explain the occurrence of high resistivity GaAs, without invoking automatic compensation or even a high degree of compensation. (Author)

AD-264 444 Div. 25
(TIPSP/TL) OTS price $4.60

Southwest Research Inst., San Antonio, Tex.
INVESTIGATION OF YIELD COLLAPSE OF STIFFENED CIRCULAR CYLINDRICAL SHELLS WITH A GIVEN OUT-OF-ROUNDNESS,
by R. C. DeHart and N. L. Basdekas. May 61,
52p. incl. illus. table.
(Contract Nonr-265000, Proj. NR 064-435)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, *Structural shells, Failure (Mechanics).) (*Stresses, Pressure.) (Theory, Elasticity, Stability, Sheets, Analysis, Plastic flow, Life expectancy, Tests.)

The results are presented of an investigation of the effect of initial out-of-roundness on the strength of stiffened cylindrical shells composed of material having a nonlinear stress-strain relation. The initial part of the investigation deals with existing methods of analysis for determining circumferential elastic strains in the stiffener. This is followed by a presentation of strain data acquired from six models representing three stiffened shell configurations. The strain data is then used to evaluate the validity of the methods of analysis and establish strength criteria. (Author)

AD-264 453 Div. 25
(TIPSM/EJH) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
LUMINESCENCE OF SOLIDS PRODUCED BY SURFACE RECOMBINATION OF ATOMS.
Final rept.,
by Kenneth M. Sancier, William J. Fredericks, and Henry Wise. 1 Aug 61, 43p. incl. illus. tables.
(Contract AF 49(638)353)
(AFOSR 1514) Unclassified report

DESCRIPTORS: (*Photochemistry, *Luminescence, *Phosphorescence, Heat, Energy, Measurement, Solid state physics, Solids.) (Surface properties, *Luminescent materials, *Phosphors, *Excitation, Gas discharges, Photoemission.) (*Calcium compounds, *Magnesium compounds, *Oxides, Excitation, *Recombination reactions, Nitrogen, Atoms.) (*Calcium compounds, *Oxides, Excitation, Catalysts, Manganese.) Spectrographic analysis, Reaction kinetics, Chemical reactions, Thermochemistry, Laboratory equipment, Test equipment, Calorimeters.

This report includes:
LUMINESCENCE OF SOLIDS EXCITED BY ENERGETIC SPECIES FROM A GASEOUS DISCHARGE. I. LUMINESCENCE SPECTRA, by Kenneth M. Sancier, William J. Fredericks, and Henry Wise. 1961.

LUMINESCENCE OF SOLIDS EXCITED BY ENERGETIC SPECIES FROM A GASEOUS DISCHARGE. II. RECOMBINATION COEFFICIENTS, by Kenneth M. Sancier, William J. Fredericks, and Henry Wise. 1961.

LUMINESCENCE OF SOLIDS EXCITED BY ENERGETIC SPECIES FROM A GASEOUS DISCHARGE. III. MEASUREMENT OF ABSOLUTE ENERGIES RELEASED AS LUMINESCENCE AND HEAT, by Kenneth M. Sancier, William J. Fredericks, and Henry Wise. 1961.

AD-264 468 Div. 25
(TIPSP/MFA) OTS price $1.60

Syracuse U. Research Inst., N. Y.
LOW TEMPERATURE ELECTRON TRAPPING LIFETIMES AND EXTRINSIC PHOTOCONDUCTIVITY IN N-TYPE SILICON

DOPED WITH SHALLOW IMPURITIES,
by R. Levitt and A. Honig. 1 Aug 61, 16p. incl. illus. tables (Technical note no. 1)
(Contract AF 49(638)966)
(AFOSR-1433) Unclassified report

DESCRIPTORS: (*Low temperature research on *Photoconductivity in *Silicon with *Chemical impurities.) (Conductors, Electrons, Hall effect, Nuclear spin, Resonance, Temperature.) (Instrumentation, *X-ray spectrometers, Oscillators, Generators.) Tables.

The trapping lifetimes tL are generally independent of temperature between 4.2 K, and 1.2 K, and are inversely proportional to the compensating acceptor concentration. This latter was determined using a recently developed combined infrared radiation and spin resonance method. The trapping cross-section result for phosphorus donors is about 000,000,000,005 square centimeters at 3 K. This is about an order of magnitude larger than the value obtained from the giant trap theory of M. Lax. Also, the concentration independence of the cross-section in the region of temperature independent tL is not accounted for easily. (Author)

AD-264 482 Div. 25
(TIPSP/MFA) OTS price $1.10

Uppsala U. (Sweden).
ANALYSIS OF MAGNETIC FIELD VARIATIONS IN THE VICINITY OF LIGHTNING DISCHARGES.
Summary rept. no. 1, 30 Sep 58-30 Apr 61,
by Harald Norinder. 30 Apr 61, 4p.
(Contract AF 61(052)171)
(AFCRL-732) Unclassified report

DESCRIPTORS: (Analysis of *Magnetic fields near *Lightning, Flight paths, Harmonic analysis, *Electric discharges, Statistical analysis and Data.) (*Electromagnetic fields, *Photographs, Oscillographs, Photographic analysis, Data, Recording devices.) (Theory, Analysis.) Sweden.

AD-264 483 Div. 25
(TIPSP/JDP) OTS price $1.10

Uppsala U., (Sweden.).
SOME CHARACTERISTICS OF A TOROIDAL PINCH WITH A REVERSED FIELD,
by S. Berglund and S. Svennerstedt. 17 May 61, 6p. incl. illus. (Technical note no. 4)
(Contract AF 61(052)170)
(ARL - 126) Unclassified report

DESCRIPTORS: (*Magnetic pinch, *Plasma physics, Stability, Heating.) (Gas ionization, Gas discharges, Spectrographic analysis, Optical spectrometers.)

A description is given of an experimental set up for a large toroidal pinch. The primary system creates in the following order: (1) a weak quasi-stationary axial field, (2) the main gas current, and (3) a strong pulsed axial field in opposite direction to the weak one. The plasma fields and associated motions were studied by magnetic probes, and the ionization stages of various elements in the discharge by optical spectroscopy. Results on the stability and the general behavior of different discharge types are given. (Author)

AD-264 488 Div. 25, 8
(TIPSP/MFA) OTS price $8.10

Washington U., Seattle Coll. of Engineering.
CURRENTS INDUCED ON THE SURFACE OF A CONDUCTING CIRCULAR CYLINDER BY A SLOT,
by Gerard Hasserjian, A. Ishimaru, and G. Held. Sep 61, 74p. incl. illus. tables, 17 refs.
(Technical rept. no. 50)
(Contract AF 19(604)4098)
(AFCRL-551) Unclassified report

DESCRIPTORS: (*Cylindrical bodies, *Induction systems, *Electric currents, Electric fields, Inductance, Surfaces, *Electrical conductance, Duct inlets, Conductivity, Wiring diagram.) (Functions, Mathematical logic, Fourier analysis, Partial differential equations, Series, Integration, Integrals.) Tables.

A partial study of currents induced on circular, conducting cylinders by narrow radiating slots is made. First, a brief and general formulation of the radiation fields of slots on cylinders is made. Then, the problem of an infinite axial slot is examined thoroughly for all cylinder sizes. An expansion for the fields, very close to the slot, on large radius cylinders, is also obtained. Sample computations are made, for various ranges of cylinder radius, and the order of the errors are discussed. The problem of a circumferential slot, of constant excitation, is also considered. An asymptotic expansion obtained for this case yields the surface current distribution for values of axial distances that are smaller than the square of the circumference of the cylinder. Since one of the objectives of this study is to determine mutual coupling between two slots on a cylinder, the last section presents a formulation of the equivalent network in terms of the surface and feed line currents. (Author)

AD-264 491 Div. 25, 7
(TIPSP/TL) OTS price $9.60

Energy Conversion and Semiconductor Lab., Mass. Inst. of Tech., Cambridge.
THEORETICAL AND EXPERIMENTAL RESEARCH ON THERMOELECTRICITY.
Scientific rept. no. 5, 15 Jan-15 July 61.
15 July 61, 118p. incl. illus. tables.
(Contract AF 19(604)4153)
(AFCRL-763) Unclassified report

DESCRIPTORS: (Theory and, Experimental data on, *Thermoelectricity, Electric power production, Cooling, Semiconductors, Diodes, Materials, Alloys, Lead alloys, Tellurides.) (Intermetallic compounds, Bismuth alloys, Antimony alloys, Tellurium alloys, Selenium alloys.) (Physical properties, Crystal structure, Electrical conductance, Thermal conductivity, Magnetohydrodynamics.) Tables.

Materials research has continued in the examination of the II-VI, IV-VI and V-VI compound systems and several types of semiconductor devices have been investigated. A new method of determining the carrier effective mass from infrared reflections has been developed in connection with the investigation of the anomalous thermal conductivity and electronic properties of PbTe. The temperature dependances of the thermoelectric parameters of the Bi-Se-Te-Sb system are reported throughout the composition range. The electrical characteristics of indium-doped p-n junctions in CdTe are described. The use of p-n junctions as photovoltaic converters with high photon densities produced by a thermal source is examined. A study of the germanium oscillistor is presented and the preliminary experimental results are discussed. An Esaki diode DC-AC converter is under investigation and design criteria for this device are described. (Author)

Division 25-PHYSICS

AD-264 493 Div. 25, 17
(TIPSM/DRW) OTS price $3.60

Stanford U., Calif.
THERMAL BUCKLING OF CENTRALLY HEATED CIRCULAR PLATES,
by Alain Queinec. June 61, 29p. incl. illus. tables (Rept. no. SUDAER 106)
(Contract AF 49(638)223)
(AFOSR-989) Unclassified report

DESCRIPTORS: (*Disks, Heating, Thermal expansion, *Thermal stresses, Stresses, *Buckling, Deflection, Theory, Mathematical analysis, Differential equations, Non-linear differential equations, Integration.) (Tests, *Metal plates, Steel, Aluminum, Disks, Test equipment, Test methods.)

The behavior of a centrally heated flat circular plate with axisymmetric temperature distribution and free edge conditions is investigated theoretically and checked experimentally. Thermal stresses occur when the temperature is not uniform and cause buckling if the temperature rise is sufficiently large. The buckling mode is axisymmetric. Large deflections are obtained for temperatures above the critical value. Theoretical calculations include solutions of the buckling problem as well as the post-buckling behavior of the plate. Attempts are made to introduce the effect of initial irregularities in the plate and to solve the large deflection problem. Experimental data give temperature distributions and deflected shapes. The results obtained from the theory are checked with a satisfactory degree of accuracy. (Author)

AD-264 495 Div. 25
(TIPSP/TL) OTS price $4.60

Stanford U., Calif.
BUCKLING OF THIN SHELLS,
by Nicholas J. Hoff. Aug 61, 42p. incl. illus. tables (Rept. no. 114)
(Contract AF 49(638)223)
(AFOSR-1422) Unclassified report

Paper presented on the eightieth birthday of Dr. Theodore von Karman in Washington, D. C., on May 11, 1961.

DESCRIPTORS: (*Structural shells, *Buckling.) (Cylindrical bodies, Impact shock, Stresses.) (Simulation of *Deformation and plastic flow by Sheets.)

A historic review of the development of our ideas on buckling is presented. It continues with a report of work on the stability of thin shells now under way at Stanford University. The results obtained so far in this investigation can be presented under three headings: First, a new solution is found to the classical small-deflection equations of the stability of thin-walled circular cylindrical shells. The second part deals with the large displacements developing when the thin circular cylindrical shell suddenly snaps through into a polyhedral buckled shape often designated as the diamond shape. In the final part the transmission of the axial load through the fully buckled circular cylindrical shell is studied. (Author)

AD-264 498 Div. 25
(TIPSP/WH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CERTAIN RECORDS IN ULTRA-ACOUSTICS, (O Nekotorykh Rekordakh Ul'traakustiki)
by Yu. Ya. Borisov and L. O. Makarov. 1 Sep 61, 4p. incl. illus. (Trans. no. MCL-1229 of Ultrasonics in the Technology of the Present and Future (Ul'trazvuk V. Tekhnike Nastoyashchego i Budushchego) Moscow, pp. 77-80, 1960)
Unclassified report

DESCRIPTORS: (*Ultrasonics, Transducers, Sound.) (*Acoustics, Ultrasonic radiation, Focusing, Lenses.) (USSR, Translations, Technological intelligence.) Piezoelectric transducers.

AD-264 504 Div. 25
(TIPSP/WH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
RADIATION OF A CHARGE MOVING PARALLEL TO THE INTERFACE OF TWO MEDIA,
by G. M. Garibyan and O. S. Mergelyan. 28 Aug 61, 11p. (Trans. no. MCL-1032 of Izvestiya Akademii Nauk Armyanskaya SSR, Seriya Fizikomatematicheskaya Nauk 12:123-129, 1960)
Unclassified report

DESCRIPTORS: (*Particles, *Electromagnetic waves, Cerenkov radiation, Electrons.) (Mathematical analysis, Partial differential equations, Integration.)

The problem of the radiation of a charged particle moving parallel to the interface of two media is solved. The method used makes it possible to solve this problem very simply and to obtain certain new results applicable mainly to the radiation in the medium where the particle itself is moving. (Author)

AD-264 511 Div. 25
(TIPSE/CCD) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
LIMITS OF THE POSSIBILITIES OF NEMAG, ARISING FROM THE INSTABILITY OF THE STATE WITH NEGATIVE CONDUCTIVITY,
by A. L. Zakharov. 5 Sep 61, 23p. incl. illus. (Trans. no. MCL-1262 of Poluprovodnikovyye Pribory I Ikh Primeneniye; Sbornik Statey Issue no. :103-124, 19 0)
Unclassified report

DESCRIPTORS: (*Amplifiers, Generators, *Semiconductors, *Solid state physics, Instrumentation, Conductivity, Design, Analysis.) Technological intelligence, *Translations, USSR.

Negative transverse conductivity in a hole-type semiconductor the use of which constitutes the basis of the semiconductor instrument NEMAG, exists only for rather weak transverse fields. Therefore strong fields formed by the carriers themselves and contamination centers, as well as fields arising from the formation and development of space charges, will eradicate the negative conductivity of the instruments. In this study there are found quantitative criteria which determine the possibility of the practical creation of a state with negative conductivity: the maximum degree of alloying and the time of the automatic breakdown of the negative conductivity. (Author)

AD-264 548 Div. 25, 30
(TIPSP/JDP) OTS price $6.60

Aerospace Corp., El Segundo, Calif.
A REVIEW OF THE PRESSURE BAR TECHNIQUE FOR

MEASURING TRANSIENT PRESSURES,
by Ieuan R. Jones. 30 June 61, 56p. incl. illus. tables, 26 refs. (Rept. no. TDR-594(1208-01)TR-3)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Pressure, Transients, Measurement, *Piezoelectric gages.) (Pressure gages, Calibration.) (Shock waves, Propagation, Piezoelectric gages.)

The theoretical and experimental aspects of the pressure bar technique for measuring transient pressures are reviewed and a detailed analysis of the composite piezoelectric pressure bar is presented. Various calibration techniques are discussed. A composite piezoelectric pressure bar which was used in studies of shock wave propagation is described. (Author)

AD-264 551 Div. 25
(TIPSP/JDP) OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE ANALYTICAL DESCRIPTION OF A MULTICOMPONENT PLASMA IN HIGH-FREQUENCY FIELDS,
by Alan Q. Eschenroeder. Aug 61, 38p. 22 refs. (Rept. no. UB-1363-P-100, pt. 2)
(Contract AF 30(602)2077)
(RADC TN 61-150) Unclassified report

DESCRIPTORS: (*Plasma physics, *Electric fields, Kinetic theory, Reaction kinetics, Transport properties, Integral equations.) (Electrons, Particles, Gas discharges, Kinetic theory, Numerical methods and procedures.)

The thermokinetic equations governing coupled nonequilibrium phenomena are formulated for a multicomponent plasma in an alternating electric field. The concepts of chemical kinetics are combined with those of gaseous electronics so that the interaction between the two types of phenomena can be studied. The Boltzmann transport equation is used for the electrons, and macroscopic relationships are developed for the heavy particles. The equations are coupled in a general manner including chemical, vibrational, and electronic nonequilibrium processes. Boundary conditions are derived approximately for cold metallic walls and for gaseous surroundings. Ranges of validity are delineated for the application of simplified forms of the fundamental equations. (Author)

AD-264 622 Div. 25
(TIPSP/MFA) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ULTRASONICS (Ul'trazvuk),
by V. M. Fridman. 18 Sep 61, 66p. incl. illus. table (Trans. no. MCL-1298)
Unclassified report

DESCRIPTORS: (*Handbooks of *Ultrasonics and Ultrasonic properties, Processing, Crystallization, Cavitation, Vibrations, Chemical properties, Physical properties.) (Industrial research, *Laboratory equipment, Transducers, Flowmeters, Radiators.) (Mathematical analysis, Fourier analysis.) (Translations, USSR, Technological intelligence.)

An extensive study of ultrasonics technology is presented in handbook form. Applications to industrial research are presented and descriptions of equipment are given with photographs of various devices are portrayed. Discussions of ultrasonics theory and principles of applications are stated at some length.

AD-264 661 Div. 25, 15
(TIPSP/WH) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
SOME UNIQUENESS THEOREMS IN THE THEORY OF ELASTICITY,
by J. H. Bramble and L. E. Payne. Oct 61, 21p. (Technical note no. BN-261)
(Contract AF 49(638)228, Proj. 17501)
(AFOSR-1530) Unclassified report

DESCRIPTORS: (Theory of *Elasticity, Shear stresses, *Nonlinear systems.) (Stresses, Applied mathematics.) (Geometry, Integrals, Operators (Mathematics), Differential equations.)

It is known that in the first boundary value problem of classical elasticity the range of values of Poisson's ratio for which the solution is unique may be extended to include values outside the range of physical interest. It is shown that certain other interesting boundary value problems in classical elasticity have unique solutions for an extended range of values of Poisson's ratio. Such results may prove useful in non-linear elasticity. (Author)

AD-264 664 Div. 25, 4, 30
(TIPSM/TCG) OTS price $1.60

Callery Chemical Co., Pa.
DETERMINATION AND ANALYSIS OF THE POTENTIALITIES OF THERMAL ENERGY STORAGE MATERIALS.
Quarterly rept. no. 1, 1 July-30 Sep 61,
by H. W. Wilson. 30 Sep 61, 13p. incl. illus.
(Contract AF 33(616)7224)
Unclassified report

DESCRIPTORS: (*Materials, High temperature research, Storage, Thermodynamics, Heat of fusion, Heat transfer, Thermal conductivity, Energy, Determination, Measurement, Analysis.) (*Calorimeters with Platinum, *Crucibles, Design.) (*Laboratory furnaces, Graphite, Crucibles, Design, Tests.) (Boric acids, Chemical reactions with Lithium compounds, Hydroxides.) (*Borates, Salts of *Lithium compounds, Oxides, Synthesis.) (Sodium compounds, Fluorides, Melting, Thermal conductivity.) *Laboratory equipment, Test equipment.

A program is being conducted to determine and analyze the potentialities of various thermal energy storage materials. Emphasis at present is on the storage of thermal energy utilizing the latent heat of fusion of the storage materials. Calibration of the Cu block drop calorimeter was rechecked; the results agreed with previous determinations. Pt capsules for making measurements of Li2O.B2O3 were designed. Preparation of Li2O.B2O3 by dehydrating mixtures of LiOH and H3BO3 is being studied. The thermal conductivity of NaF was measured. NaF was successfully melted and maintained at 1060 C in the high density graphite crucible of the thermal conductivity furnace but the proper temperature gradients required for the conductivity measurements were not obtained. (Author)

AD-264 670 Div. 25
(TIPSP/MFA) OTS price $4.60

General Electric Co., Schenectady, N. Y.
DIFFERENTIAL ANALYZER STUDIES OF DYNAMIC BEHAVIOR OF GAS LUBRICATED RIGID VERTICAL ROTORS,

by T. C. Coffey, K. W. Jenkins, and others. Oct 61, 41p. incl. illus. tables. (Contract Nonr-284400, Proj. NR 097-348) Unclassified report

DESCRIPTORS: (*Analog computers, *Axial flow turbine rotors, Lubrication, Gases, Hydrodynamics, Fluid flow, Films, Motion, Synchronizers, Gas bearings.) (*Perturbation theory, Equations, Algebra, Trigonometry, Reynolds number.) Tables.

A study is made of the motion of a vertical rotor with prescribed initial conditions using fluid film forces based on the steady whirl analysis. Specific objectives are three-fold: first, the calculated motion of the rotor can be checked against experimental evidence in order to verify the validity of the hypothesis which was employed to calculate the fluid film forces; secondly, the stability of the synchronous whirl motion will be examined; and thirdly, we hope to determine the effect of damping and coupling terms on the stability of synchronous whirl. The dynamical equations of the rotor are integrated on the PACE differential analyzer. (Author)

AD-264 681 Div. 25, 8
(TIPSE/RD) OTS price $4.60

Diamond Ordnance Fuze Labs., Washington, D. C.
SHOCK-TUBE MICROWAVE PROPAGATION MEASUREMENTS USING DIELECTRIC-SLAB APPROXIMATION,
by F. L. Tevelow and H. D. Curchack. 21 Aug 61, 50p. incl. illus. (Rept. no. TR-962)
(DOFL Proj. no. 34400)
Unclassified report

DESCRIPTORS: (*Shock tubes, Test facilities, Microwave equipment, Hellium, Argon.) (Tests, Test methods, Microwave bridges.) (*Microwaves, *Propagation, Gases, Mathematical analysis, Waveguides.) (Shock waves, Electrons, Density.) (Plasma physics, Gas ionization, *Magnetohydrodynamics.)

Transient measurements were made using a microwave bridge and a shock-generated plasma where plasma dimensions were comparable with the test wavelength. The assumption was made that the waveguide containing the plasma slab was completely filled and that the plasma was uniform. These boundary conditions allowed rigorous theoretical analysis that included reflections at the slab interfaces and the effects of electron-atom collisions. Results show that data are significantly reproducible; also that densities from 10 to the 10th power to 10 to the 13th power electrons/cm can be detected using a 10 kmc test signal. (Author)

26. PRODUCTION AND MANAGEMENT

AD-263 999 Div. 26, 17
(TIPSM/BRW) OTS price $4.60

General Dynamics/Fort Worth, Tex.
EFFECTS OF ANDROFORMING ON MATERIAL PROPERTIES.
Interim Technical engineering rept. no. 1, 1 May-31 July 61,
by C. Lantz, C. Crandall and others. Aug 61, 49p. incl. illus. tables.
(Contract AF 33(600)42847)
(ASD TR 7-910, vol. 1) Unclassified report

DESCRIPTORS: (Aluminum alloys, Stainless steel, Titanium alloys, *Sheets, Metal plates, Processing, Metal forming presses.) (*Machines, Operation, Nomographs.) (Processing, Deformation, Mechanical properties, Tensile properties.) (Manufacturing methods, Airframes, Aircraft, Guided missiles.)

The forming parameters of the Model J. Androform machine are being established for the forming elements furnished with the machine. Testing to date indicates that symmetrical contours formed with 0.040-in. Al alloy sheet are predictable and that past practices of operating the machine through trial and error methods will be reduced by 90%. The effects of the process on properties of materials formed to date (2024-T3 aluminum) show an increase in both tensile and compression values, and a loss in per cent elongation. (Author)

AD-264 117 Div. 26, 17
(TIPSM/BRW) OTS price $4.60

Aeroprojects, Inc., West Chester, Pa.
INVESTIGATION OF ULTRASONIC WELDING OF ALL-BETA TITANIUM ALLOY.
Final rept.,
by J. Byron Jones, H. L. McKaig, and John G. Thomas. Sep 61, 34p. incl. illus. tables (Research rept. no. RR-61-77)
(Contract NOw 60-0643)
Unclassified report

DESCRIPTORS: (*Ultrasonics, *Welding, Spot welding, Welds, Spot welds, Sheets, Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Physical properties, Mechanical properties, Tensile properties, Heat treatment, Aging, Deformation, Microstructure.)

The results of this work indicate the feasibility of using ultrasonic spot-type welding to fabricate structural members from thin strips of conditioned all-beta Ti alloy. The strength/weight ratio of the all-beta alloy used for these welding studies had been increased to approximately 1.4 million by heat treatment alone and to slightly more than 1.5 million by cold-rolling the heat-treated material. Furthermore, the ultimate strength/weight ratio of the conditioned all-beat alloy is superior to that obtainable with strips of stainless steel, or special alloys, in similar thicknesses. Successful multi-ply structures were assembled by both through-welding and ply-by-ply ultrasonic welding techniques. The welding characteristics of hardened, tool-steel welding tips were found to be superior to those of Inconel X. Satisfactory levels for input power, clamping force, and welding interval were established by statistical methods in order to secure ultrasonic welds of high strength. From the information obtained in the present work, structural assemblies of high strength, but lighter in weight than the ones currently in use, can be fabricated from thin strips of conditioned, all-beta Ti alloy by ultrasonic spot-type welding. (Author)

AD-264 240 Div. 26, 17
(TIPSM/BRW) OTS price $1.10

Aeroprojects, Inc., West Chester, Pa.
"LTRASONIC WELDING OF REFRACTORY METALS.

Progress rept. no. 2, 1-31 May 61,
by C. R. Frownfelter. 4 Aug 61, 7p. incl. illus.
(Contract NOw 61-0410-c)
Unclassified report

DESCRIPTORS: (*Ultrasonics, *Welding, Spot welding, Sheets, Heat resistant alloys, *Refractory materials, Metals, Molybdenum alloys, Niobium alloys, Titanium alloys, Tungsten, Physical properties, Mechanical properties, Microstructure.) (Spot welding, Machines, Pressure, Transducers, Power supplies.)

Effort was continued to determine optimum welding machine settings for ultrasonic welding of sheets (0.005 to 0.010 in.) of arc-cast Mo-0.5Ti, and Nb-10Mo-10Ti (D-31) alloys. Temperature rise (weld zone) measurements were made on 0.020-in. D-31 alloy sheets in an attempt to determine the clamping force which effects the best impedance match between the machine and the weldment. Photomicrographs are presented of cross sections of welds in 0.005-in. Mo-0.5Ti and 0.008 in. D-31 alloys.

AD-264 270 Div. 26, 17
(TIPSM/EET) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF PROCEDURES FOR WELDING 2-INCH-THICK TITANIUM-ALLOY PLATE.
Bimonthly rept. no. 6,
by R. L. Koppenhofer, W. J. Lewis and others.
30 June 61, 14p. incl. illus. tables.
(Contract NOw 60-0390-c)
Unclassified report

DESCRIPTORS: (*Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Metal plates, Ship plates, Submarine hulls.) (Manufacturing methods, *Welding, Welds, Arc welding, Welded joints, Welding rods.) (Impact shock, Mechanical properties, Tensile properties, Chemical properties, Hardness.) (Test methods, Arc welding, Controlled atmospheres, Argon, Tensile properties, Impact shock, Hardness, Microstructure.)

Lehigh and NRL restraint tests were made on Ti-13V-11Cr-3Al alloy plate with filler wire that matched the composition of the base plate. No cracking was encountered in these welds. In addition, a 30-in.-long weld was made in 2-in.-thick Ti-13V-11Cr-3Al plate with filler wire that matched the composition of the base plate. Weld-metal ultimate and yield strengths were somewhat lower than those of the base plate. Elongation of the weld metal was higher than that of the base plate in the transverse direction but lower than that of the base plate in the longitudinal direction. Impact properties of the weld metal were very low, but were similar to those of the base plate. Hardness data obtained for welds in Ti-6Al-4V base plate with Ti-6Al high-purity filler wire were lower than for any weld except those made with A-55 filler wire. Vacuum-fusion analysis of this weld showed very low O and H contents. (Author)

AD-264 500 Div. 26, 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
VACUUM CASTING OF FILM-FORMING ALLOYS IN A PROTECTIVE ATMOSPHERE,
by Yu. A. Nekhendzi and M. T. Bogdanov. 4 Aug 61, 19p. incl. illus. (Trans. no. MCL-961 of Primeneiye Vakuuma v Metallurgii, Moscow, pp. 30-38, 1960)
Unclassified report

DESCRIPTORS: (*Alloys, *Casting, Vacuum systems, Controlled atmospheres, Argon.) (Metallic compounds, Aluminum compounds, Magnesium compounds, Oxides, Nitrides, Films, Chromium alloys, Nickel alloys, Heat resistant alloys, Casting, Air, Chemical reactions.) (Technological intelligence, Translations, USSR.)

A number of industrial heat-resistant alloys were tested for castability, at different temperatures, when cast in air and in an Ar atmosphere under vacuum. The experimental series included nimonics no. 3, 6, and 300, alloyed on base 15/75 Cr/Ni with such elements as Mo, W, Nb, Ti, and Al, totaling up to 20%. The same nimonics were also alloyed on bases 20/10 and 15/15 with Mo, W, and Nb, totaling up to 5%, and practically without Al and Ti (0.2%). It was found that the castability of alloys containing Ti and Al was considerably improved if the melting, and especially pouring, were carried out in an Ar atmosphere under vacuum. Where the alloys contained no Ti or Al, the use of a protective atmosphere for the melting and pouring had no effect on castability. (Author)

AD-264 503 Div. 26, 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
VACUUM MELTING AND POURING ON NICKEL BASE-ALLOYS,
by K. K. Chuprin, V. M. Amonenko, and I. S. Bolgov. 4 Aug 61, 15p. incl. illus. tables (Trans. no. MCL-960 of Primeneniye Vakuuma v Metallurgii, Moscow: pp. 23-29, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Nickel alloys, Chromium alloys, Vacuum furnaces, Vacuum systems, Melting, Casting.) (Films, Chemical reactions, Air, Oxygen, Hydrogen, Nitrogen, Metals, Degasification.) (Technological intelligence, Translations, USSR.) Mechanical properties, Impurities, Grains (Metallurgy).

Melting and pouring of Ni base alloys in vacuum up to 10 to the -5th power mm Hg improved their mechanical properties, namely: toughness by 80%, durability by 30%, area reduction (at room temperature) by 50%, and elongation by 30%. In addition, a perfectly pure alloy was produced, showing no film formation. In vacuum melted heat-resistant alloys TiC particles were very fine and uniformly distributed throughout the grain pattern. The volatilization rate of the alloying components increased slightly as the vacuum level was raised from 0.1 to 10 to the -5th power mm Hg. The amount of volatilized chromium increased by 0.3%, that of Al by 2.5%, while the C content remained practically unchanged. In vacuum melting and pouring of heat-resistant alloys the gas content decreased sharply. The lowering of the O content depended on the vacuum level as well as on the intensity of interaction between the liquid alloy and the material of crucibles. The H and N degassing of the alloy reached a maximum at 0.001 mm Hg. (Author)

AD-264 513 Div. 26, 4
(TIPSM/EJH) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CONTINUOUS METAL STEAM METHOD OF HYDROGEN PRODUCTION,
by V. V. Lebedev. 1 Sep 61, 22p. incl. illus.

tables (Trans. no. MCL-1164 of Trudy Instituta Goryuchika Iskopayemykh - Gazifikatsiya i Goreniye Topliva, Moskva, Iz-vo AN SSSR 11:215-225, 1959)
Unclassified report

DESCRIPTORS: (*Hydrogen, *Industrial production.) (Metals, Metallic compounds, Oxides, Powder metals, *Steam, *Oxidation-reduction reactions with Carbon compounds, Monoxides, Temperature.) Chemical reaction, Reactions kinetics, Technological intelligence, Translations on USSR.

A continuous metal-steam process of H production was studied in an enlarged laboratory installation. It was shown that such a process can be set up on an industrial scale. Gases rich in CO and containing a large amount of inert constituents were used as reducing agents. The continuous metal-steam method offers a number of advantages: compactness of the installation; high output; efficient material utilization; and low reaction temperatures (450 to 480 C). (Author)

AD-264 518 Div. 26, 17
(TIPSM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INDUSTRIAL UNITS FOR WELDING BY ELECTRON BEAM,
by V. A. Kostyuk, Yu. M. Dozlov and others.
28 Aug 61, 14p. (Trans. no. MCL-1177 of Svarochnoye Proizvodstvo 1:41-43, 1961)
Unclassified report

DESCRIPTORS: (*Industrial equipment, *Welding, Electron beams, Machines, Automation, Vacuum systems, Vacuum pumps, Operation, Tests, Refractory materials, Metals, Heat resistant alloys.) (Technological intelligence, Translations, USSR.)

Two automatic industrial units for welding workpieces by an electron beam under conditions of high vacuum are described. The ELU-1 and ELU-2 units consist of an operating chamber, mechanisms for holding and moving the workpiece, an electron gun, vacuum station, high voltage power-supply source, three-phase interrupter, and gun control panel. Welding tests on refractory, heat-resistant, rare and readily oxidizing metals and alloys (Zr, Ta, Cu, W, Mo, Al, and steel) are discussed.

AD-264 633 Div. 26
(TIPSM/EJH) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
INVESTIGATION OF THE FEASIBILITY OF WELDING MOLYBDENUM SHEET WITH A DEOXIDIZING AND GRAIN-REFINING FLUX.
Interim rept. no. 1, 30 Dec 60-30 Mar 61,
by A. Clyde Willhelm. 28 Apr 61, 10p. incl. illus. tables (Rept. no. 4916-1257-I)
(Contract NOw 61-0366-d)
Unclassified report

DESCRIPTORS: (*Molybdenum, *Molybdenum alloys, Titanium alloys, Sheets, Welding.) (*Arc welds, *Welds, *Welded joints, *Welding, *Arc welding.) (*Welding fluxes, Carbon black with Ethylenes, Glycols or Epoxy resins and Ceramic materials.) Silicon compounds, Titanium compounds, Aluminum compounds, Zironium compounds, Oxides, Deoxidation, Feasibility studies, Microstructure, Grains (Metallurgy).

Experiments were made to evaluate the feasibility of welding Mo and Mo alloy sheet by means of a deoxidizing and grain-refining flux in conjunction with the tungsten-inert-gas-shielded electric-arc welding method. Although the results indicate that the method is promising, closer control of the welding variables will be necessary to properly evaluate the method as well as the relative worth of different flux combinations. Further work will consist of further evaluations made under controlled conditions and using a standard bending technique. (Author)

27. PROPULSION SYSTEMS

AD-263 911 Div. 27, 17, 30
(TIPSM/BRW) OTS price $5.60

Naval Weapons Lab., Dahlgren, Va.
DETERMINATION OF THE DRIVING FORCE FOR CRACK INITIATION FROM ACOUSTIC RECORDS OF G SUB c TESTS ON HIGH-STRENGTH METALS FOR ROCKET MOTOR CASINGS.
Rept. on Fracture Work Rates of SP Materials,
by H. E. Romine. 4 Oct 61, 52p. incl. illus. tables (NWL rept. no. 1779)
Unclassified report

DESCRIPTORS: (*Rocket cases, Sheets, *Steel, *Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Fracture (Mechanics), Detection, Test equipment, Test methods, Vibration, Acoustics, Ink, Mechanical properties, Tensile properties, Stresses.) Rocket motors, Solid rocket propellants, Hydrostatic pressure, Tests.

Fracture instability tests with a double-inking procedure were employed with the center-notched G sub c, test specimen to establish conditions at crack initiation. With this information an acoustic method was used to determine the driving force G* sub Nc required to initiate cracking from a machined notch. The audio instrumentation can be added to the G sub c test without affecting standard procedure. Tests with reduced length of starting slot indicated that G* sub Nc for a given type of notch is a relatively constant material property similar to the critical G sub c* value for fast fracture. The G* sub Nc value can be used in fracture toughness equations for the motor case to predict a slot size at which cracking should just initiate in a single cycle of stressing the material to yield strength. The general equivalence of K* sub Nc to K sub Ic was an indication of adequate notch sharpness. (Author)

AD-264 133 Div. 27, 25, 21
(TIPSP/WH) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
A PHOTON ROCKET,
by G. G. Zel'kin, tr. by Z. Jakubski. Feb 61, 10p. incl. illus. (Rept. no. STL-TR 61-5110-7, Trans. from Priroda, no. 11, 1960)
Unclassified report

DESCRIPTORS: (*Space flight, Rocket motors, Rocket propulsion, *Photons, Ejection, Velocity, *Mass energy relations.) (Astronautics, Spaceships.) (USSR, Translations, Technological intelligence.) Exhaust gases.

The utilization of light quants (photons) to attain velocities approaching the speed of sound

in space flight is discussed. The following phases of the problem are considered: comparative performance of chemical, plasma, ionic, and nuclear fuels; the amount of fuel required; the energy of photon rockets; and equipment for the production of directed radiation.

AD-264 231 Div. 27, 25
(TIPSM/JE) OTS price $7.60

Air Force Cambridge Research Labs., Bedford, Mass.
ELECTRIC PROPULSION FOR SPACE VEHICLES,
by Marcus O'Day. May 61, 70p. incl. illus. 10 refs. (Rept. no. AFCRL 357)
Unclassified report

DESCRIPTORS: (*Electric propulsion, *Spaceships, *Ion rockets, Rocket motors, Plasma physics, Plasma jets, Electrostatic accelerators, Thrust.) (Specific impulse, Cesium, Ions, Hydrogen, Ion bombardment, Colloids, Solids, Liquids, Electrodes, Ion beams, Magnetic fields, Magnetic moments.) (Erosion, Corrosion, Electric arcs, Gases, Vapors, Shielding.) Design.

The present status of electric propulsion of space vehicles is presented and is limited to projects which exist only in the United States. The descriptions involving the fundamental principles of electric propulsion constitute the first part of the paper. The second portion of the report is composed of appendices which give more detail as well as mathematical derivations. (Author)

AD-264 263 Div. 27, 26, 14
(TIPSM/BRW) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF IMPROVED HIGH-STRENGTH PREIMPREGNATED MATERIALS FOR FILAMENT-WOUND ROCKET MOTOR CASES.
Informal progress rept. no. 2 (preliminary) 1-31 Aug 61.
26 Sep 61, 8p. incl. tables (Report no. L0525-01-2)
(Contract NOw-61-0642-c)
Unclassified report

DESCRIPTORS: (Rocket cases, *Filament-wound construction, Materials, Processing, Handling, Shipping, Specifications.) (Manufacturing methods, Processing, *Glass textiles, Filaments, Fibers, Resins, Impregnation.) (Tests, Test methods, Mechanical properties, Tensile properties, Stresses, Rings, Pressure vessels.)

Fifteen spools of 20-end, no-end-out, PD 48 finish, glass roving from Lot 37 were selected at random for use as production control standards. An average ultimate tensile strength of 311,000 psi was obtained on specimens of this material. The loss on ignition (average 1.21%), with the exception of one spool, was within the specified range of 1.5 + or - 0.5%. The average weight of glass roving per yard was 0.628 g with less than 3% variation. NOL ring specimens and an 18-in.-diam Polaris boss chamber were fabricated by wet winding techniques. The chamber failed at a burst pressure of 866 psig with hoop filament stress of 305,900 psi.

AD-264 316 Div. 27, 12
(TIPSM/BRW) OTS price $1.60

Goodrich, B. F., Co., Akron, Ohio.
AFT-END CLOSURE STUDY FOR POLARIS A-3 ROCKET MOTOR CASE.
Monthly progress rept. no. 2, 26 June-26 July 61, by H. W. Stevenson and R. A. Harrington.
17 Sep 61, 11p. incl. illus. tables.
(Contract NOw 61-0499-c)
Unclassified report

DESCRIPTORS: (*Rocket cases, Combustion chambers, Filament wound construction, Design, Structures, Mathematical analysis, Model tests, Hydrostatic pressure.) (Reinforcing materials, Glass textiles, Aluminum alloys, Structural shells, Adhesive tapes, Laminates.) (Resins, Rubber adhesives, Metal plastic adhesives, Metal glass adhesives, Exhaust nozzles, Bonding.) (*Guided missiles, Surface to surface, Underwater to surface.

Burst test data are tabulated for nine 1/3-scale test chambers. Three of the chambers were constructed without exhaust port reinforcement to determine how much of the laminate tension can be supported by adhesion of the filament to the aft metal part. Various methods of applying reinforcements of Scotch pre-preg tape to the port area were evaluated.

AD-264 373 Div. 27, 7, 1
(TIPSB/CCH) OTS price $2.60

Naval Air Station, Lakehurst, N, J.
INFLIGHT REFUELING, INCREASED EVACUATION OF 150 GALLON FUEL CELLS,
by W. J. Hanley and D. E. Hayes. 16 Aug 61, 9p. illus. (NAS Lakehurst rept., Serial no. 9-61)
Unclassified report

DESCRIPTORS: (*Refueling in flight by *Aircraft, Design and Installation and Tests of Refueling pumps in Operation and Effectiveness of *Fuel cells for Reliability and Safety in Ejection.)

This report covers the development, prototype, installation, and testing of a fuel cell evacuation and transfer system designed for increased rate of fuel evacuation from 150 gallon inflight refueling cells. The system was specifically designed for use in the ZPG-2 and ZPG-2W type airships for employemnt in emergency and/or operational inflight refueling situations. The evaluation tests of this prototype installation were conducted during the period 5 January 1959 to 30 November 1960 for the purpose of ascertaining the reliability, safety, and operating features of the system. Test data recorded during the execution of tests indicate that the system as designed is capable of evacuating inflight refueling at the rate of 50 gpm provided the fuel cell itself conforms to specific design criteria as pertains to adequate internal venting of the cell. It is recommended that this system be incorporated in the ZPG-2 and ZPG-2W type airships for expeditious fuel cell evacuation. (Author)

AD-264 516 Div. 27, 10
(TIPSM/EJH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
PROBLEM OF THE STRENGTH OF ZhRD (LIQUID-FUEL ROCKET ENGINE) BURNER WITH CONNECTED ENVELOPES,
by S. A. Dubenetz. 28 Aug 61, 19p. incl. illus.
(Trans. no. MCL-1176 of Izvestiya Vysshikh Uchebnykh Savendeniy - Aviatsionnaya Tekhnika 1:133-142, 1958)
Unclassified report

DESCRIPTORS: (*Rocket motors, Liquid rocket propellants, Combustion chambers, *Combustion chamber liners, Design, Cooling, Pressure, High pressure research, Theory, Mathematical analysis.) (*Combustion chamber liners, Bonding, Welds.) (*Combustion chamber gases, *Coolants, Liquids, Pressure.) Cylindrical bodies, Technological intelligence, Translations on USSR.

Investigations of certain problems associated with the strength and resistance of the cylindrical part of the ZhRD burner with connected envelopes were carried out during 1954-1956 at the MAI (Moscow Aviation Institute). They included both theoretical and experimental research. One of the theoretical investigations is briefly set forth in this article. (Author)

AD-264 517 Div. 27
(TIPSP/WH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE VELOCITIES THAT ARE POSSIBLE IN THE UNIVERSE,
by S. Zonshayn. 28 Aug 61, 7p . (Trans. no. MCL-1245 of Literaturnaya Gazeta 2: Columns 1-5, 11 May 61)
Unclassified report

DESCRIPTORS: (Spaceships, *Space flight, *Velocity.) (Rocket motors, Nuclear power plants, *Ion rockets, Photons.) (Photons, Relativity theory, Mass energy relation.) (USSR, Translations, Technological intelligence, Space flight.)

AD-264 519 Div. 27, 9
(TIPSM/EJH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
FLOW OF GAS THROUGH POROUS METAL WALLS,
by Yu. V. Il'in. 1 Sep 61, 14p. incl. illus.
(Trans. no. MCL-1166 of Izvestiya Vysshikh Uchebnykh Zavedeniy - Aviatsionnaya Tekhnika 1: 65-73, 1959)
Unclassified report

DESCRIPTORS: (*Rocket motors, Liquid rocket propellants, *Combustion chambers, *Cooling.) (Gas turbines, Cooling.) (*Gas flow, Membranes, *Porous metals, Metals, Stainless steel.) Theory, Technological intelligence, Translations on USSR.

AD-264 570 Div. 27, 17, 26
(TIPSM/EJH) OTS price $12.00

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE.
Quarterly rept. no. 4, 1 Apr-30 June 61,
by Robert P. Brody and William E. Helfrich.
31 July 61, 161p. incl. illus. tables. (Rept. no. PWA-1987)
(Contract DA 19-020-ORD-5230, Proj. TB4-004)
(Rept. no. WAL TR 766.2/1-3)
Unclassified report

DESCRIPTORS: (*Rocket cases, Rocket motors, Solid rocket propellants.) (*Heat resistant alloys, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Aging, Heat treatment, Mechanical properties, Tensile properties, Microstructure, Grains (Metallurgy).) Sheets, Welded joints, Manufacturing methods, Processing, Production, Forging, Welding, Arc welding, Electron beams, Oxygen, Hydrogen, Test methods, Photographic analysis, Radiographic analysis, Tests.

Sustained-load notched strength of cold-rolled, aged sheet (H content of 70 ppm) at the 180,000 psi yield strength level is lower than that of 200 ppm H content sheet. The pronounced aging response at 900 F of press-forged material with 0.10 to 0.20% oxygen was reaffirmed. Multiple-pass TIG welding on U- and V-type joints produced fine gains and superior ductility. Good tensile properties resulted from open-die press forging, and closed-die press forging of 14-in diameter domes. Closed-die hammer-forged pancakes exhibited nonuniform tensile properties after aging at 800 or 900 F. Subscale 14-in. diameter rings roll-forged at 1800 to 2000 F were satisfactory in tensile ductility and flow-turnability. Residual stresses of 165,000 psi average and 200,000 psi maximum were measured in the circumferential direction in as-flow-turned 9.4-in-diam. cylinders; stress relief treatment at 900 to 950 F gave satisfactory relief.

AD-264 607 Div. 27, 10
(TIPSM/EJH) OTS price $7.60

Southwest Research Inst., San Antonio, Tex.
EFFECT OF JET FUEL ADDITIVES ON FILTERABILITY AND WATER SEPARATION CHARACTERISTICS.
Rept. for May 59-Nov 60 on Aviation Fuels,
by Robert K. Johnston and J. P. Cuellar, Jr.
June 61, 67p. incl. illus. tables.
(Contract AF 33(600)39425, Proj. 3048)
(ASD TR 61-345) Unclassified report

DESCRIPTORS: (*Fuel filters, Aviation fuels, Jet engine fuels, Fuels, Petroleum, *Fuel additives, Additives for Corrosion inhibition, Ice prevention.) (Fuel systems, Porous filters, Porous glass, Porous materials, Glass textiles, Glass.) (Jet engine fuels, Aviation fuels, Contamination, Chemical impurities, Iron compounds, Oxides, Water.) (Jet engine fuels, Water, Separation.) Test facilities, Test equipment, Test methods.

The effect of corrosion inhibitors on filtration and water separation characteristics of JP-4 fuel was studied in a single-element filter-separator test facility, using five types of commercial elements and housings designed to simulate full-scale flow conditions. Standard coarse A/C dust and water were used as test contaminants; a brief study was made using iron oxides. Adverse effects of the corrosion inhibitors varied widely, and the element types differed in efficiency and modes of failure. The CRC water separometer, a bench-scale apparatus, gave a general correlation with the single-element results. Interaction of additives with fuel constituents caused difficulty in early work, but otherwise the separometer repeatability was satisfactory. Preliminary work on a reference fluid indicated that an odorless solvent may be suitable. (Author)

AD-264 666 Div. 27, 12, 14
(TIPSM/REB) OTS price $1.10

Kidde, Walter and Co., Inc., Belleville, N. J.
FIBERGLASS MOTOR CASE STUDY. POLARIS SECOND STAGE END CLOSURE.
Progress rept., 1-30 Sep 61,
by T. Siuta. 12 Oct 61, 3p. illus. (Rept. no. 3642-6)
(Contract NOw 61-0497-c)
Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, Underwater to surface, Rocket motors, *Rocket cases, Glass textiles, Filament wound construction, Design, Aerodynamic configurations, Configuration, Deflection, Tests.) (*Combustion chamber liners, Rubber, Design, Configuration.)

Efforts were directed toward the following objectives: (1) fabrication and test of ovaloid models using the zero shear contour; (2) redesign of rubber liner configuration; (3) design of 1/4-scale model rocket case configuration and all necessary molds and hardware for fabrication of the mandrel; and (4) evaluation of existing program status utilizing the Program Evaluation System. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-263 965 Div. 28, 15
(TIPSP/TL) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
TEST OF SOME LEARNING MODELS FOR DOUBLE CONTINGENT REINFORCEMENT,
by Patrick Suppes and Madeleine Schlag-Rey. 15 Aug 61, 20p. incl. tables (Technical rept. no. 38)
(Contract Nonr-22517) Unclassified report

DESCRIPTORS: (*Learning, Social sciences, *Probability, *Statistical tests, Mathematical prediction, Sequences, Matrix algebra.) (Test sets, Conditioned reflex, Motor reactions.) (Analysis, Theory, Sampling, Tables.) Belgium, History.

AD-263 979 Div. 28, 23
(TIPSB/CCH) OTS price $2.60

Personnel Lab., Aeronautical Systems Div., Lackland Air Force Base, Tex.
SUMMARY OF REGRESSION ANALYSES IN THE PREDICTION OF LEADERSHIP CRITERIA, AIR FORCE ACADEMY CLASSES OF 1961 THROUGH 1963,
by John A. Creager and Robert E. Miller. Apr 61, 18p. incl. tables.
(Proj. 7717)
(ASD TN 61-41) Unclassified report

DESCRIPTORS: (*Behavior, Psychometrics, Group dynamics.) (*Leadership, Tests, Effectiveness, Analysis, Mathematical prediction, Experimental data, Statistical analysis, Reliability.)

A battery of experimental tests is administered each year to entering cadets at the Air Force Academy. Validities against academic and leadership criteria are routinely determined. In addition, multiple linear regression methods have been applied to the problem of predicting the Cadet Effectiveness Rating as a leadership criterion. This report summarizes the results of such regression studies on the Academy classes of 1961 through 1963. Considerations governing the design of each experimental battery are pointed out. Battery validities and regressions are examined within classes, and, where possible, across classes. Multiple correlations with the criterion were found to run as high as .49. Interaction variables, however, made no contribution to prediction beyond that of the primary variables. Findings are discussed from the point of view of developing a battery which can be used as a valid leadership predictor for screening Academy applicants. (Author)

AD-263 981 Div. 28, 23, 15
(TIPSB/CCH) OTS price $1.10

Personnel Lab., Aeronautical Systems Div., Lackland Air Force Base, Tex.
A FURTHER NOTE ON THE FAMILIARITY EFFECT IN JOB EVALUATION,
by Joseph M. Madden. June 61, 4p. incl. table.
(Proj. 7734)
(ASD TN 61-47) Unclassified report

DESCRIPTORS: (*Human engineering, Job analysis, Mathematical analysis, Effectiveness, Statistical functions, Reliability.)

Job evaluations were found to vary as a function of the extent to which raters were familiar with them. In addition, there was an interaction between the job rated and the familiarity level of the rater. It is suggested that an adequate control of the familiarity effect would be maintained by maximizing the familiarity level of the raters. However, this should be done by using job descriptions and other materials rather than obtaining raters with a high degree of familiarity gained through personal work experience. A personal relationship with the job rated may reduce the validity of the ratings if affective factors are operating. (Author)

AD-263 982 Div. 28, 23
(TIPSB/CCH) OTS price $1.10

Personnel Lab., Aeronautical Systems Div., Lackland Air Force Base, Tex.
AIR FORCE ACADEMY SELECTION VARIABLES AS PREDICTORS OF SUCCESS IN PILOT TRAINING,
by Lonnie D. Valentine, Jr. Sep 61, 6p. incl. illus. tables.
(Proj. 7717)
(ASD TN 61-52) Unclassified report

DESCRIPTORS: (*Training, Flight, Selection, Tests.) (*Psychometrics, Aptitude tests, Pilots, Mathematical prediction, Effectiveness.)

Of the first class graduating from the Air Force Academy, 172 entered Flying Training. Scores from the Academy selection tests, given five years earlier, were correlated with pass/fail criteria in Primary and Basic Flying Training, and with final grades in Basic Training. None of the College Entrance Examination Board scores were predictive of success in Flying Training. The Pilot composite of the Air Force Officer Qualifying Test had moderately high validity for passing both Primary and Basic Training. Neither of the sets of selection tests showed much discrimination for final grades of the successful students. (Author)

AD-264 122 Div. 28, 6, 16, 30
(TIPSB/CCH) OTS price $2.60

Bell Helicopter Co., Fort Worth, Tex.
RATE DISCRIMINATION AND CONTROL IN A MULTIPLE TRACKING TASK,
by Lowell E. Wilkerson and W. G. Matheny.

Sep 61, 21p. incl. illus. table (Rept. no. D228-420-005)
(Contract Nonr-167000)
Unclassified report

DESCRIPTORS: (*Measurement from Rate-of-climb indicators of Detectors and Control panels of Helicopters by Pilots in *Tracking on Television display systems, Computers.) (Job analysis, Vision, Visual thresholds, Brightness, Reaction time, Age factors, Experimental data, Analysis.) Instrumentation, Aircraft equipment.

The study reported here is concerned with encoding rate information and the measurement of the helicopter pilot's ability to discriminate and control such information when the information is encoded in a manner more analogous to real world visual conditions than the traditional symbolic dial and pointer. At the same time the operator was required to perform a tracking task analogous to the tracking requirement placed upon him in maintaining the spatial position of his vehicle during an approach to landing. Within the limitations of available experimental equipment symbols were generated which were analogs of real world forms and which changed their size in accordance with the apparent size changes of the real world forms as they were approached. The study compared performance of a contracting circle encoding rate, with performance of a line expanding from the center of the display to the top and with a line expanding from the bottom of the display to the center, while keeping an aircraft symbol in the center of an inscribed circle. Twenty-four flight naive people from the Engineering Department and twelve experienced helicopter pilots were given sixteen trials on each of the symbols; forty-eight in all. (Author)

AD-264 190 Div. 28
(TIPSB/JAB) OTS price $3.60

California U., Berkeley.
STUDIES IN CONFORMITY AND YIELDING. A SUMMARY AND INTERPRETATION.
Final rept.,
by Read D. Tuddenham. 1961, 32p. 23 refs.
(Contract Nonr-22214, Proj. NR 170-159)
Unclassified report

DESCRIPTORS: (*Attitudes, Personality, *Sociometrics, Group dynamics, *Perception.)

AD-264 314 Div. 28
(TIPSB/MS) OTS price $1.60

Georgia U., Athens.
THE CONSTANT-RATIO RULE AND LIFTED WEIGHTS,
by Milton H. Hodge, Mary L. Piercy, and Morris J. Crawford. June 61, 16p. incl. illus. tables.
(Scientific rept. no. 1)
(Contract AF 19(604)7299)
(ESD TN 61-61) Unclassified report

DESCRIPTORS: (*Perception, Stimulation, Learning.) (*Reaction (Psychology), Mathematical prediction, Statistical analysis.) (Proprioception, Sensitivity.)

The present experiment was designed to evaluate a model of choice behavior, the constant-ratio rule, with a single dimensional stimulus ensemble of lifted weights. The results indicate that the rule can successfully predict the responses made to the stimulus objects. The concepts of stimulus and response confusion are advanced to explain the results. (Author)

AD-264 317 Div. 28
(TIPSB/MS) OTS price $1.10

Georgetown U., Washington, D. C.
SOME PERSONAL AND SOCIAL CHARACTERISTICS THAT IDENTIFY PERSONALITY AND CHARACTER DISORDERS,
by John H. Rohrer. 15 Sep 61, 7p.
(Contract Nonr-153007)
Unclassified report

DESCRIPTORS: (*Personality, Behavior, Emotions, Needs.) (*Psychiatry, Abnormal psychology, Adjustment (Psychology).) (*Psychoneurosis, Diagnosis.)

The findings suggest the central core problem in the development and function of the personality and character disordered group which centers around ego function and structure. First there is the problem of an arrested ego development. This has many of the characteristics of ego weakness. Yet it has a different quality than the type of ego weakness that one sees, for example, in the psychoneurotic although many of the symptoms are the same. There are the strong dependency needs, as evidenced in the projected wish expressed in the percentage of personality disorders who worried about parents. There is the delay in social development, there is the problem with schooling and enuresis which are symptomatic of ego weakness. However, in the neurotic these occur sporadically and fluctuate with the stresses and level of anxiety that the individual is experiencing. By contrast, for the character and personality disordered group those are habitual modes of acting. In anticipation of a future report on the dynamics of the character and personality disordered group on which we have collected data, it appears that they experience minimal anxiety and/or guilt feelings. Secondly, there is the problem characteristic of the personality and character disordered group not to be found to such a great degree in the other psychological disorders; namely the lack of opportunity for establishing an ego ideal. (Author)

AD-264 364 Div. 28
(TIPSB/MS) OTS price $8.10

American Inst. for Research, Pittsburgh, Pa.
DERIVING TRAINING DEVICE IMPLICATIONS FROM LEARNING THEORY PRINCIPLES. VOLUME I. GUIDELINES FOR TRAINING DEVICE DESIGN, DEVELOPMENT AND USE,
by M. Paul Willis. July 61, 81p. 19 refs.
(Contract N61339-784)
(NAVTRADEVCEN 784-1) Unclassified report

DESCRIPTORS: (*Training devices, *Learning, Theory, Design, Standards.) (*Behavior, Classification.)

Investigation was made of the feasibility of developing criteria for the design, development, and use of training devices on the basis of principles formulated by current psychological learning theories. A number of implications for the training device situation were derived from learning principles common to most contemporary theorists. Additional implications were derived from principles characteristic of, or particularly emphasized by, specific learning theorists. The derived implications were presented as a set of guidelines to extend and amplify present human factors guides for training device design and use. These device implications or guidelines were presented in a tabular format organized and indexed according to relevance for (1) specific members of a nineteen category task/behavior classification system, and (2) types of general

design problems, e.g., stimulus presentation, performance feedback, or operator output. (Author)

AD-264 377 Div. 28, 23, 30, 1
(TIPSB/MS) OTS price $8.60

Illinois U., Urbana.
EFFECTS OF PROGRAMMED PERCEPTUAL TRAINING ON THE LEARNING OF CONTACT LANDING SKILLS,
by Jack A. Adams and Lyle E. Hufford. 28 Apr 61, 87p. incl. illus. tables, 32 refs.
(Contract N61339-297)
(NAVTRADEVCEN 297-3) Unclassified report

DESCRIPTORS: (*Perception, Training, Pilots, Learning, Landing.) (*Programming, *Training devices, *Flight simulators, Display systems.)

This project consisted of an experiment on the effect of one type of perceptual (open-loop) training on the learning of contact landing. Thirty non-pilots, divided equally into two matched groups, participated. The experimental group received perceptual training with a programmed visual display; the control group did not receive this training. As criterion trials, both groups performed contact landings in an operational flight trainer equipped with a non-programmed visual attachement. The results indicated that the programmed presentation evaluated did not contribute to the learning of contact landings. The implications of the findings, and research issues in the evaluation of visual attachments and of pilot performance are discussed. (Author)

AD-264 381 Div. 28
(TIPSB/MS) OTS price $3.60

American Inst. for Research, Pittsburgh, Pa.
DERIVING TRAINING DEVICE IMPLICATIONS FROM LEARNING THEORY PRINCIPLES. VOLUME II: METHODOLOGY,
by M. Paul Willis and Richard O. Peterson. July 61, 32p. incl. illus. tables, 40 refs.
(Contract N61339-784)
(NAVTRADEVCEN 784-2) Unclassified report

DESCRIPTORS: (*Training devices, *Learning, Theory, Design, Standards.) (*Behavior, Classification.)

The primary purpose of the study was to investigate the feasibility of developing criteria for the design, development, and use of training devices on the basis of principles formulated in current psychological learning theories. The specific aspect of the study treated in this second volume is the attempt which was made to devise some objective, systematic means of structuring or directing the relatively individual, creative process of deducing practical training implications from learning principles. Among the specific methods and/or products devised to aid in accomplishing this methodological objective were the following: (1) development of lists of specific and common learning principles, (2) development of a task/behavior taxonomy or classification scheme, and (3) development of a four-step matrix approach to facilitate systematic comparisons, of learning principles and task/behavior categories, in the process of deriving training device implications. (Author)

AD-264 568 Div. 28
(TIPSB/MS) OTS price $16.00

American Inst. for Research, Pittsburgh, Pa.
DERIVING TRAINING DEVICE IMPLICATIONS FROM LEARNING THEORY PRINCIPLES. VOLUME III: SPECIFIC LEARNING PRINCIPLES,
by M. Paul Willis, J. A. Rubin, and J. F. Janesko. July 61, 242p. incl. illus. tables, 96 refs.
(Contract N61339-784)
(NAVTRADEVCEN 784-3) Unclassified report

DESCRIPTORS: (*Training devices, *Learning, Theory, Design, Bibliography, Dictionaries.)

Investigation was made of the feasibility of extending and amplifying present guidelines for training device design, development, and use by utilizing principles contained in contemporary psychological theories of learning. In reporting the study, three separate volumes were developed. This third and final volume consists of a rather extensive compilation of learning theory principles specific to a number of contemporary learning theorists. The present set of learning principles is considered to be a convenient and logical source from which additional training device implications might be sought in future efforts. Glossaries and bibliographies are provided for each theoretical position. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

No Entries

30. RESEARCH AND RESEARCH EQUIPMENT

AD-263 936 Div. 30
(TIPSP/WH) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
AN INPUT ROUTINE USING ARITHMETIC STATEMENTS FOR THE IBM 704 DIGITAL COMPUTER,
by Don N. Turner and Vearl N. Huff. Sep 61, 41p. (TN D-1092)
Unclassified report

Also available from NASA, Wash., D. C., as NASA Technical note D-1092.

DESCRIPTORS: (*Digital computers, *Programming of Coding of Punched card methods.) Simulation, Data processing systems.

An input routine has been designed for use with FORTRAN or SAP coded programs which are to be executed on an IBM 704 digital computer. All input to be processed by the routine is punched

on IBM cards as declarative statements of the arithmetic type resembling the FORTRAN language. The routine is 850 words in length. It is capable of loading fixed- or floating-point numbers, octal numbers, and alphabetic words, and of performing simple arithmetic as indicated on input cards. Provisions have been made for rapid loading of arrays of numbers in consecutive memory locations. (Author)

AD-263 939 Div. 30, 6
(TIPSB/MS) OTS price $2.60

Naval Research Lab., Washington, D. C.
NAVAL DATA HANDLING SYSTEM CIRCUITS,
by F. R. Fluhr. 16 Aug 61, 24p. incl. illus.
(NRL rept. no. 5645)
Unclassified report

DESCRIPTORS: (*Data processing systems, Data storage systems, Analog systems, Radar tracking, Radar target designators, Target position indicators, Plan position indicators, Computers, Velocity, Circuits, Wiring diagrams.)

The Naval Data Handling System (NDHS) installed at the Naval Research Laboratory's Chesapeake Bay Annex is a 24-radar-target, rate-aided, analog tracking system. The NDHS has provisions for a detector, two trackers, and a monitor in the tracking part of the system. These four stations can insert, update, or change coordinate position data in the analog store. All stations, except that of the monitor, can compute and modify the velocity coordinates. Each station can control any of the 24 analog stores through the station store control panel. The monitor station can be switched so that this station becomes a display only station, while the store control is taken over by an external data link such as the AN/SSA-21. Rate-aiding is provided for all targets and is done automatically on all targets which have the velocity computation turned on. The rate-aiding is of the straight-line prediction type which is updated each time the radar antenna sweeps through the target azimuth. Velocity is computed automatically when the operator turns the velocity computer on and repositions the tracking marker in the usual manner. The velocity information is also refined during the normal tracking operation. (Author)

AD-263 983 Div. 30, 26
(TIPSM/BRW) OTS price $2.60

Advanced Metals Research Corp., Somerville, Mass.
INFRARED DETECTION OF WELD DEFECTS.
Final rept. on Infrared Detection Nondestructive Testing Applications,
by Robert K. Lewis and John T. Norton.
31 June 61, 30p. incl. illus. table (Rept. no. WAL 550/1-1)
(Contract DA 19-020-ORD-5228, Proj. TB4-004)
Unclassified report

DESCRIPTORS: (*Non-destructive testing, *Welds, Welded joints, Infrared radiation, Infrared detectors, Thermistors, Bolometers, Infrared equipment, Radiometers, Temperature, Measurement, Test equipment, Design.)

In the first phase of the program an electrical analog was used to simulate the surface temperature distribution in plates containing various types of defects when the plate was subjected to a known temperature gradient. The resulting temperature field patterns were analyzed quantitatively to give temperature differences due to the presence of the defect. This information permits a calculation of the minimum size of detectable defects when the performance of the temperature sensing device is known. The second phase of the program involved designing, constructing, and testing a device employing infrared techniques for measuring very small temperature differences in the vicinity of room temperature. This device, a micro-radiometer, is capable of measuring temperature differences as low as 0.05 degrees at a temperature level of 50 C. Temperature differences were recorded on mental specimens which revealed the presence of artifically introduced defects. (Author)

AD-263 989 Div. 30, 17, 14
(TIPSM/BRW) OTS price $2.00

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF METHODS AND INSTRUMENTS FOR MECHANICAL EVALUATION REFRACTORY MATERIALS AT VERY HIGH TEMPERATURES.
Rept. for 15 May 60-15 May 61, on Behavior of Metals,
by Delbert H. Fisher, Donald N. Gideon and others. June 61, 73p. incl. illus. tables.
(Contract AF 33(616)6155, Proj. 7351)
(ASD TR 61-74) Unclassified report

DESCRIPTORS: (High temperature research, *Heat resistant alloys, *Refractory materials, Mechanical properties, Tensile properties, Stresses, Deformation, Determination, Measurement.) (Test facilities, Test equipment, Test methods, Vacuum furnaces, Heating elements, Optical equipment.) (*Heating elements, Graphite, Refractory coatings, Vapor plating, Tantalum compounds, Carbides.)

A system was developed for determining the conventional mechanical properties of materials at temperatures up to 4000 F in vacuum. Techniques for obtaining stress-strain properties in tension and compression are described. Strains are measured optically directly at the gage section to an accuracy of + or - 50 mu in./in. in a 2-in. gage section. An evaluation of the system was made using a Mo-0.5Ti bar material. Exploratory work was conducted on graphite and a refractory sheet metal. The results of these tests are included. With the objective of developing a temperature source for use above 4000 F, experiments were conducted to produce and to evaluate TaC-coated graphite heaters. Good coatings of TaC were produced both on thin-wall cylindrical heaters and on spiral heaters. It was found that C contamination of the atmosphere occurred such that W shields or W specimens were attacked at temperatures under 5400 F. Possible means of improving carbide coatings are suggested. (Author)

AD-264 007 Div. 30, 25, 8
(TIPSE/RD) OTS price $15.50

International Business Machines Corp., Poughkeepsie, N. Y.
PROJECT LIGHTNING.
Quarterly progress rept. no. 9, 1 Dec 60-28 Feb 61.
28 Feb 61, 239p. incl. illus. tables.
(Contract NObsr-77508)
Unclassified report

DESCRIPTORS: (*Computers, Computer logic, Memory devices, Circuits.) (*Superconductors, Electrical properties, Thermal conductivity.) (Thin films, Physical chemistry, Molecular beams, Nucleation.) (*Memory devices, Superconductors, Circuits.) (*Computers, Switching circuits, Trigger circuits, Thin films, Superconductors.) *Cryogenics, Superconductivity.

Contents: CRYOGENICS - Physical characterization of components, Studies of static electrical characteristics of Cryotrons, Studies of dynamic electrical characteristics of Cryotrons, Static and dynamic thermal properties of Cryotrons, Associated circuit problems, Subtractor ring circuit, Substrate coupling, Flux trapping, Device and circuit fabrication techniques, Physical chemistry of thin films, Surface photolysis, Nucleation of molecular beams on metal surfaces, Insulating films. MACHINE ORGANIZATION - Organizational features of superconductor systems, Cryotron high-speed memory systems, Functional unit analysis, Mechanization design and analysis.

AD-264 016 Div. 30, 14
(TIPSM/EJH) OTS price $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
RESEARCH AND DEVELOPMENT REPORT ON THE DEVELOPMENT OF A TUNGSTEN SOURCE OF INTENSE THERMAL RADIATION.
Final rept.,
by L. Banet, A. Hirschman, and T. I. Monahan.
29 May 56, 6p. illus. (Lab Proj. 5046-2, pt. 4)
(AFSWP-854) Unclassified report

DESCRIPTORS: (*Thermal radiation, Sources, *Lighting systems, Lighting equipment, *Searchlights, Incandescent lamps, Filaments, Tungsten.) (Materials, Thermal radiation, Test equipment.)

In certain problems pertaining to the effects of intense thermal radiation on materials, a source having a color temperature of approximately 3200 K is desirable. Such a source was developed at the Naval Material Laboratory. The source furnishes an irradiance of approximately 6.7 cal/sq cm sec over an area which is essentially elliptical, with a major axis of 1/2 inch and a minor axis of 3/8 inch. The radiant flux for this source is derived from four Navy 12-inch searchlights with 1,000 watt tungsten lamps. The radiation is brought to fall on a 36-inch paraboloidal reflector and is condensed at the mirror's focus. The radiometric characteristics of this source are reported. (Author)

AD-264 049 Div. 30, 15
(TIPSP/TL) OTS price $1.60

David Sarnoff Research Center, Princeton, N. J.
MORE ABOUT THRESHOLD LOGIC,
by R. O. Winder. 14 July 61, 13p. incl. illus. 14 refs. (Scientific rept. no. 1)
(Contract AF 19(604)8423)
(AFCRL-701) Unclassified report

DESCRIPTORS: (*Mathematical logic, *Computer logic, *Functions, Special functions, Integrals, Algebra, Inequalities, Matrix algebra, Equations, Groups (Mathematics), Vector analysis, *Linear programming.) (Synthesis, *Electrical networks, *Switching circuits, Theory, Design, *Symposia.)

Ideas are discussed on Switching Theory and Logical Design. The main subject is compound synthesis. The family of functions of n arguments realizable in a single stage becomes a vanishing fraction of all switching functions of n arguments as n grows (for n equals 7 the ratio is about 10 to the 28-1/2 power). An algorithm is provided for determining 2-realizability -- realizability with two threshold elements. The approach produces a good solution in any case, but one guaranteed optimal only for 2-realizable functions. A geometric terminology is used; this new language is also used where higher necessary conditions for realizability are discussed. A conjecture that certain of these conditions might be sufficient is disproved; three related conditions are treated in a common language. Optimal integral single-stage realizations are considered. A conjecture, that such a realization gives equal arguments equal weights, is disproved. (Author)

AD-264 142 Div. 30, 8
(TIPSE/DLW) OTS price $3.60

Radiation, Inc., Palo Alto, Calif.
SUPER-POWER KLYSTRON TUBE-TEST FACILITY.
Quarterly rept. no. 3, 1 Apr-30 June 61,
by Roby L. Blessing. 30 June 61, 32p. incl. illus. (Rept. no. G-108-Q3)
(Subcontract to Varian Associates, Palo Alto, Calif.)
Unclassified report

DESCRIPTORS: (*Klystrons, Test equipment, *Test facilities.) (Pulse generators, Modulators, Modulator tubes, Resistors, Rectifiers, Diodes, Magnets, Cooling, Capacitors, Power supplies, Pulse transformers, Construction, Design.) (*Triodes, Modulator tubes, Design, Electrical properties, Tests.)

Effort was made to complete the construction of the switch tube test supply in order to expedite the switch tube test program. The magnet supplies were completed as well as the body and collector-capacitor banks. The interim modulator power supply and crowbar circuitry, with the exception of the final assembly of the crowbar logic circuitry, was made available for test. A significant amount of panel work was completed and these panels were wired for installation in the control console. (Author)

This report includes:
Machlett Labs., Inc., Springdale, Conn.
DEVELOPMENT OF A 350-kV, 25-AMPERE PULSE TRIODE,
by H. Langer and C. V. Weden. Quarterly rept. no. 3, 1 Apr-30 June 61.
(Subcontract to Radiation at Stanford, Palo Alto, Calif.)

AD-264 156 Div. 30, 15, 26
(TIPSP/TL) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE OPTIMAL CONTROL OF SYSTEMS WITH DISTRIBUTED PARAMETERS,
by A. G. Butkovskii and A. Ya. Lerner, tr. by Z. Jakubski. Apr 61, 9p. incl. illus. (Rept. no. STL-TR 61-5110-10, Trans. from Doklady Akademii Nauk SSSR, Vol. 134, no. 4, 1960)
Unclassified report

DESCRIPTORS: (*Automation, *Control systems, Vector analysis, Functions, *Partial differential equations, Difference equations, *Programming.) (Temperature, Heat transfer, Theory.) (Sheets, Metals, Time, Heat exchangers.)

Three very general optimal control problems are formulated wherein the controlled process is governed by a partial differential equation and the control forces are subjected to constraints. As an example of the second of these three problems the author considers the optimal control of the temperature, Q, within a metal slab as it moves through a furnace. (Author)

Division 30-RESEARCH AND RESEARCH EQUIPMENT

AD-264 227 Div. 30
(TIPSE/RD) OTS price $6.60

Aeronutronic, Newport Beach, Calif.
A MAGNETIC INTEGRATOR FOR THE PERCEPTRON PROGRAM.
Summary rept. 1 June 60-31 Aug 1,
by J. K. Hawkins, C. J. Munsey, and R. A. Stafford. 29 Sep 61, 73p. incl. illus. tables.
(Pub. no. U-1405)
(Contract Nonr-291300)

Unclassified report

DESCRIPTORS: (*Digital computers, Memory devices, *Computer logic.) (*Analog computers, Data storage systems.) Learning, Integrators, Instruction manuals.

Research concerns a special-purpose electronic computer which can be described as a hybrid analog-digital machine whose elements possess certain logic and memory properties. The digital elements of the computer are unit-delay memory elements whose binary outputs are linear-logic threshold functions of its inputs and of its analog storage elements. The analog elements are storage devices whose values can be changed by incremental amounts as a special function of the states of the digital elements and (binary) inputs to the computer. The machine was conceived as a general-purpose extension of the perceptron model. A basic form of the perceptron is a network consisting of a first layer of fixed linear-logic elements, followed by one or more layers of adaptive (variable coefficient) linear-logic elements. Logical feedback (cross-coupling) is achieved by permitting connections from subsequent to prior layers in the net. The computer described consists of 32 basic Perceptron elements, together with appropriate input and control circuitry. By external control, any one or more of the elements may be made either a fixed linear-logic element or an adaptive one. By means of program board wiring, any desired network structure can be arranged by interconnecting suitable elements. (Author)

AD-264 229 Div. 30
(TIPSB/CW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE IDENTIFICATION OF NESTED STRUCTURES IN PREDICTIVE SYNTACTIC ANALYSIS,
by Murray E. Sherry. May 61, 13p. 11 refs.
(Rept. no. AFCRL 174; Research note no. 1)
(Proj. 5632)

Unclassified report

DESCRIPTORS: (*Machine translation, Automatic, Language, USSR. Identification, Synthesis, Analysis.) Computers.

A successful method for the automatic translation of languages will consist of four essential stages: dictionary look-up, syntactic analysis of source language, semantic analysis of source language, and synthesis of target language. In the process of doing research on automatic syntactic analysis, it has become evident that the analysis will never become a reality until a capability to distinguish nested structures, i.e., phrases and clauses, is achieved. An approach for the recognition of Russian phrases and clauses in a predictive syntactic analysis scheme is presented. (Author)

AD-264 230 Div. 30
(TIPSB/CW) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE DESIGN OF A SIMPLE CONDITIONED-RESPONSE MACHINE.
Rept. on Cybernetics,
by J. O. McIntosh. Apr 61, 35p. incl. illus. tables, 10 refs. (Rept. no. AFCRL 188)
(Project 5632)

Unclassified report

DESCRIPTORS: (*Learning, Conditioned reflex, Motor reactions, Computers, *Analog computers, Design, Instrumentation.) Cybernetics.

Learning by conditioning as it occurs in living organisms is examined to determine which aspects of classical conditioning can be instrumented in an electronic analog. Electronic techniques for this instrumentation are discussed. A special-purpose conditioned-reflex analog and an experiment for it are described. Possible applications of conditioned reflex in data-processing are considered. (Author)

AD-264 232 Div. 30, 25
(TIPSE/WAW) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
ULTRA-HIGH PRESSURE RESEARCH,
by W. G. Field. June 61, 25p. incl. illus. (Report no. AFCRL 502)
(Proj. 4608)

Unclassified report

Presented at the 53rd Annual Meeting, American Institute of Chemical Engineers, Washington, D. C., 7 Dec 1960.

DESCRIPTORS: (*High pressure research, *Hydraulic presses, Design, Calibration.) (Temperature, Pressure, Measurement.) (*Diamonds, Growth, Single crystals.) Solid state physics.

Pressure is a form of mechanical energy, and as such is capable of effecting most chemical and physical properties of matter. The last few years have seen the development of equipment capable of generating pressures in excess of 125,000 bars with simultaneous temperatures over 3000 degrees C. The techniques which have led to the development of such ultra-high pressure equipment are described. Several important types of equipment are discussed and a 600-ton tetrahedral-anvil press is described in detail, together with means for pressure calibration and temperature measurement. Experiments which can be carried out in such a facility involve many fields of science including metallurgy, physics, chemistry, crystallography, thermodynamics, etc. Measurement procedures for such research lag the development of high pressure apparatus. Ultra-high pressure research will increase knowledge of the solid state and possibly lead to the development of new materials. Its greatest contribution will, however, be our increased knowledge of solids at normal pressure and temperature. The growth of single-crystal diamond is discussed in detail and the results of various experiments presented. Future development of high pressure physics is discussed, including methods of high pressure generation and measurement problems. (Author)

AD-264 233 Div. 30, 8
(TIPSE/DLW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ELECTRONIC ANALOG MULTIPLIER,
by Frederick F. Slack. July 61, 9p. incl. illus.
(Rept. no. AFCRL 541)
(Proj. 4649)
Unclassified report

DESCRIPTORS: (*Data processing systems, Analog systems, *Analog computers, *Electron multipliers, *Transistors, Potentiometers, Servo systems, Servomechanisms, Design.) (Solid state physics, Electronic circuits, Electric bridges, Resistance, Errors, Feedback, Measurement.) Computers.

Using a unique feature of the unijunction transistor, an all electronic solid-state analog multiplier provides four-quadrant operation over a frequency range from direct current to 40 kc with errors less than 0.75% of full scale. Multiplier accuracy is further improved through negative feedback by using two identical multipliers so that errors developed in one compensate for similar errors developed in the other. (Author)

AD-264 266 Div. 30, 14, 9
(TIPSP/TL) OTS price $14.00

Aerospace Corp., El Segundo, Calif.
HIGH MACH NUMBER AND MATERIALS RESEARCH PROGRAM. PHASE I. AEROPHYSICS RESEARCH STUDIES.
Semiannual technical rept., 1 Jan-30 June 61, comp. by R. J. Whalen. 30 June 61, 203p. incl. illus. table (Rept. no. TDR-594(1206-02)STR)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Plasma physics, *Gas flow, Aerodynamics, Hypersonics, Hypersonic flow.) (*Re-entry aerodynamics, Spheres, Cylindrical bodies, Bodies of revolution, *Hypervelocity vehicles, *Blunt bodies, *Re-entry vehicles, *Materials, *Guided missile noses.) (Sheets, Theory, Analysis, Partial differential equations, *Differential equations, Integration.) (Electron beams, Numerical analysis, Design.) (*Hypersonic nozzles, Nozzles, Helium, Hydrogen, Density, Measurement, Combustion.) (Pressure, Velocity, Shock tubes, Boundary layer, Shock waves, *Electron guns, Heat transfer.) (Control surfaces, *Test facilities, Instrumentation, Vacuum systems, Computers, Simulation.) (*Mach number, Reynolds number, Lift, Drag.)

Theoretical and experimental investigations of high speed gas dynamics were carried out. The experimental investigations included stagnation point heat transfer measurements in low Reynolds number flows in the existing helium-driven shock tunnel. Electron beam densitometer studies were continued. Modification of the existing hypersonic shock tunnel to incorporate a combustion driver and a six-foot diameter nozzle was initiated. This modification will allow an increased performance up to a Mach number equal to 30 and density altitudes to 300,000 feet. The theoretical investigations included a study of viscous and inviscid non-equilibrium hypersonic flows about blunt and sharp leading edge slender bodies. (Author)

AD-264 293 Div. 30, 15
(TIPSP/TL) OTS price $6.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PONTRYAGIN MAXIMUM PRINCIPLE.
Chapter 7 of Optimization Techniques,
by Richard E. Kopp. 1961, 54p. incl. illus.
(Contract Nonr-338400)
Unclassified report

DESCRIPTORS: (*Differential equations, Partial differential equations, *Automation, Integral equations, Remote control systems, *Programming, Cybernetics, *Telemeter systems.) (*Rockets, Exterior ballistics, Rocket trajectories.) (Theory, Analysis.) Vector analysis, Inequalities.

The study of optimum systems is discussed. The Maximum Principle is developed in a manner similar to that of Rozonoer (Automatika i Telemekanika, Oct-Dec 59) and then compared with better known approaches to the solution of variational problems. (Author)

AD-264 304 Div. 30, 8, 28, 15
(TIPSP/MFA) OTS price $4.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
A COMPARISON OF TWO PROPOSED LOGIC SYMBOL TYPES FOR LEGIBILITY AND READABILITY DIFFERENCES,
by James D. Baker and Albert J. Whitehurst.
July 61, 41p. incl. illus.
(ESD TN 61-63) Unclassified report

DESCRIPTORS: (*Statistical analysis, Electronic systems, Electronic circuits, Mathematical prediction, *Data processing systems.) (Computers, *Computer logic, Coding.) (*Instrumentation, Experimental data, Design.) Tables.

Two proposed logic symbol types were compared for legibility and readability differences. One symbol type, Shaped Symbols, used shaped forms to differentiate basic logical functions. The other symbol type, Block Symbols, utilized a specified alphabetic character inclosed within a defined area to denote logical functions. An unpublished legibility study was replicated and the results of both studies agreed. This agreement was largely attributed to constant, uncontrolled variables in both studies. A readability evaluation was conducted to functionally compare the two symbol types. The results tended to favor the use of Shape encoded symbols in situations where problem solving of functional and logical relationships, in the context of other essential information, is of prime concern and density of symbols is high. (Author)

AD-264 355 Div. 30, 8
(TIPSE/DLW) OTS price $4.60

Electronics Research Lab., U. of Calif., Berkeley.
A DISCRETE COMPENSATOR FOR SAMPLED-DATA SYSTEMS USING MAGNETIC CORES AS STORAGE ELEMENTS,
by G. G. Lendaris. 11 May 61, 39p. incl. illus. (Series no. 60, Issue no. 356)
(Contract AF 18(600)1521)
(AFOSR-1141) Unclassified report

DESCRIPTORS: *Data storage systems, *Delay lines, Magnetic cores, Memory devices, Control systems, Sampling, Functions, *Electronic circuits, Amplifiers, Computers, Design.

The construction of a discrete compensator to be used in a sampled-data control system is described. The compensator employs a discrete delay line utilizing magnetic cores to store, in pulse-width-modulated form, the sampled values of the signal. This system requires no relays or stepping switches; everything is solid state except for the amplifiers used in the sample and hold circuits, demodulation integrators, and coefficient multiplication. This tapped delay line operates like a shift register. A group of toroidal cores with coils wound on them are connected in series. Each core is set to negative saturation; then a signal is impressed onto the first core in the chain for a certain period of time. Next, a reset signal is impressed onto this first core, and simultaneously a set signal of the same amplitude is impressed onto the second core. Thus the first step of the shifting is accomplished. This can be repeated as often as desired, depending only on how many cores are in the chain. (Author)

AD-264 362 Div. 30, 26, 17
(TIPSM/BRW) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
GUIDELINES FOR THE OPERATION OF A BERYLLIUM-RESEARCH FACILITY,
by Bodo Bartocha and F. E. Brinckman, Jr.
1 Oct 61, 24p. incl. illus. table.
(NAVWEPS rept. 7198) Unclassified report

DESCRIPTORS: (*Scientific research, *Beryllium, Beryllium compounds, *Metalorganic compounds, Laboratories, Operation, Laboratory equipment.) (Personnel, Hazards, Safety, Air, Sampling, Contamination.) (Decontamination, Disposal, Research program administration, Test facilities.)

Some of the basic problems involved in conducting an intensive organoberyllium research program are discussed, and solutions to these problems are presented. A description is given of the physical facilities and layout recommended for a beryllium research laboratory, and methods of maintaining satisfactory environmental control are explained. (Author)

AD-264 436 Div. 30, 8
(TIPSE/DLW) OTS price $2.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
System Study rept. no. 5, Appendix 2 to Interim research rept. no. 9A, 1 Dec 60-28 Feb 61, on High Speed Data Processor System Research,
by Peter Warburton. 28 Feb 61, 21p. incl. illus.
(Appendix 2 to AD-264 437)
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: (*Data processing systems, Computers, *Diodes, Memory devices, Programming, Computer logic, Coding, Mathematical logic, Switching circuits, Electronic circuits, Data storage systems, Design, Costs.)

Two questions are raised about the scope of Project Lightning studies. One question asks why a kilomegacycle computer more suited to scientific work has not come out of the studies. The second question poses the problem of typing several machines together. A short discussion of these two questions is included. Another problem is discussed as to how best to prepare for cost estimating a tunnel diode computer. The instruction repertoire for the large machine design was revised. Also, a first draft of an instruction repertoire for a smaller, three-address machine is presented. Work was begun in flow charting the instructions and trial programming input-output routines. (Author)

AD-264 437 Div. 30, 8
(TIPSB/LH) OTS price $7.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Suppl. to Interim research rept. no. 9A, on High-Speed Data Processor System Research.
1 Mar 60, 74p. incl. illus. tables (Suppl. to AD-264 439)
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: (*Data processing systems, Digital computers, Computers, Memory devices, Electronic circuits, Switching circuits, Rectifiers, Diodes, Design, Semiconductors, Instrumentation.)

Investigations of surface sensing of magnetic flux switching have continued but the results are still inconclusive. A major problem is excessive coupling of the sense loop to the drive line. Methods for cancelling this coupling are being investigated. The application of a transverse field to a ferrite element has been found to reduce the switching time significantly while lowering the output voltage only slightly. The use of a precision masking jig has contributed to considerable progress in the fabrication of the close-spaced structures required for high-speed operation. A study of the alloying temperature effect on the electrical characteristics of 50-ma Ge tunnel diodes showed a sharp increase of speed ratio with lower alloying temperatures. This appears to be consistent with predictions. Electromagnetic delay-line storage techniques employing balanced-pair tunnel diode logic circuitry have been investigated. Assuming 1-kmc operation of the balanced-pair circuits, the study indicates that a 1024, 48-bit delay-line memory with 16 ns cycle time will require less than one tunnel diode per stored bit. (Author)

AD-264 439 Div. 30, 8
(TIPSB/LH) OTS price $9.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Interim research rept. no. 9A, 1 Dec 60-28 Feb 61 on High-Speed Data Processor System Research.
28 Feb 61, 114p. incl. illus. tables.
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: (*Data processing systems, *Digital computers, Computers, *Memory devices, Electronic circuits, Switching circuits, Rectifiers, Diodes, Design, Semiconductors, Instrumentation.)

Efforts were directed toward the goals of reducing to practice several circuit approaches. The circuit work is now being done not only at full rise time speed but at repetition rates in the hundreds of megacycles. An attempt to find the limit of memory regeneration speed for an individual cell and read-write amplifier resulted in read-write times of 5 nanoseconds. The leading circuit approaches were submitted to intense scrutiny from the logic point of view. (Author)

AD-264 440 Div. 30
(TIPSB/LH) OTS price $4.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
WORD SEARCHING DEVICE. PART II.
23 Sep 61, 49p. incl. illus. tables (Technical rept. no. C117-1U14, pt. 2)
(Contract AF 30(602)2300)
Unclassified report

DESCRIPTORS: (Computers, Digital computers, *Reading machines, Programming, Optics, *Optical systems, Correlation techniques, Simulation, Analysis.)

Additional work directed towards recognition of complete words is reported. It is shown that such systems are unattractive because of the extremely severe tolerance requirements to effect a satisfactory match. The basic conclusion of the report is that a word searching device utilizing letter-by-letter recognition appears most promising. The system would have four basis units: (1) a text scanner incorporating a high resolution flying spot scanner and a suitable electronic servo to permit following lines of text; (2) a letter recognizer with associated logic having a learning capability; a word detector utilizing a transparency that can be marked by grease pencil to the code of the desired key words and associated scanner, photomultiplier and logic to detect occurrences of the key words; and (4) a read-out recorder to display the occurrences of the key words for study to determine possible interest. A simplified version of the word searcher is described which would show feasibility of all of the novel elements of the proposed system. (Author)

AD-264 441 Div. 30
(TIPSB/LH) OTS price $8.10

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
WORD SEARCHING DEVICE. PART I.
23 Sep 61, 84p. incl. illus. tables (Technical rept. no. C117-1U4, pt. 1)
(Contract AF 30(602)2300)
Unclassified report

DESCRIPTORS: (Computers, Digital computers, *Reading machines, Programming, Optics, *Optical systems, Correlation techniques, Simulation, Analysis.)

Considerable effort has been directed towards determining the basic limitations of a word searching device due to the characteristics of printed text. This analysis has been aided by simulation studies based on correlation measurements made on enlargements of typical English characters and subsequent experiments in which a digital computer simulated the Word Searcher. This investigation has shown that the differences in output signal between the desired key words and possible false alarms may be quite small with the result that the equipment tolerances must be closer than originally anticipated if successful operation is to be achieved. This report presents a detailed account of the investigation to date and of the difficulties encounterd. The unexpectedly stringent tolerance requirements has led to modification of the original approach. Alternate mechanizations are considered which by-pass the fundamental limitations of the flying-spot scanner system. (Author)

AD-264 526 Div. 30
(TIPSB/MS) OTS price $1.60

Washington U., Seattle.
A GRADE PREDICTION SYSTEM PROGRAM FOR THE IBM TYPE 709,
by George R. Burket. Aug 61, 17p.
(Contract Nonr-47708)
Unclassified report

DESCRIPTORS: (*Computers, *Digital computers, *Data processing systems, Programming.) (*Programming, *Achievement tests, Mathematical prediction, Selection.) (*Records, Analysis, Punched card methods, Magnetic tape.)

AD-264 552 Div. 30, 9
(TIPSP/JDP) OTS price $10.50

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
DEVELOPMENT OF PLASMA ARC HEATERS FOR HYPERSONIC PROPULSION TUNNELS,
by E. A. Bunt, L. W. Bennett and others. May 61, 123p. incl. illus. 31 refs. (Rept. no. CM-984)
(Contract NOrd-7386)
Unclassified report

DESCRIPTORS: (*Aerodynamic heating, Instrumentation, Design, *Plasma jets, Electric arcs, *Hypersonic wind tunnels, Electric propulsion.)

Considerations that led to the selection of plasma arc heating for the hypersonic propulsion tunnels are discussed. Some of the experience gained in the operation of various prototype plasma arc heaters are reviewed. Details are also given of engineering features of interest, and certain criteria guiding the design of the full scale heater installation are emphasized. (Author)

AD-264 608 Div. 30, 17, 12
(TIPSE/CCD) OTS price $10.10

Space Technology Labs. Inc., Los Angeles, Calif.
PRESSURE VESSEL DESIGN CRITERIA,
Final rept.,
by J. W. Goodman. 31 Dec 60, 112p. incl. illus. tables (Rept. no. STL/TR-60-0000-19427)
(Contract AF 04(647)619)
(AFBMD-TR-61-9) Unclassified report

DESCRIPTORS: (Pressure vessels, Materials, Metallurgy, Design, Tests, Specifications.) (Materials, Titanium, Aluminum, Steel, Mechanical properties, Tensile properties, Hardness, Stresses, Tests.

A program was cohducted to provide experimental data to assist in establishing material selection, design, and fabrication criteria for reliable highly efficient pressure vessels. A tubular specimen was devised for the testing of high-strength materials in various tensile biaxial stress fields, and bend and tensile tests were investigated for possible correlation with pressure vessel performance. D6AC and 4340 steel were extensively tested, with limited testing of 6Al-4V titanium, 7178 aluminum and Uniwelded 4340 steel. Tensile instability in a pressure vessel was studied analytically and burst stresses of vessels which failed in this manner were accurately predicted; but tensile instability is only one mode of failure and in general no simple (coupon) test can accurately predict the significant biaxial behavior and burst stress of a given material in an actual pressure vessel. One way to establish such behavior is to perform tests in

bonafide biaxial stress fields; the miniature pressure vessel used in this investigation is a relatively inexpensive vehicle for this purpose. (Author)

AD-264 667 Div. 30
(TIPSB/CW) OTS price $1.60

Biotechnology Lab., U. of Calif., Los Angeles.
PRELIMINARY DESIGN AND ECONOMIC STUDY OF A SMALL HEAT CHAMBER,
by R. W. Allen and F. C. DeBiasio. Aug 61, 11p. incl. illus. (Technical note no. 22; Engineering dept. rept. no. 61-54)
(Contract AF 33(616)6763, Proj. 60(8-7164)
Unclassified report

DESCRIPTORS: (Heat tolerance, *Laboratory equipment, Materials, Aluminum, Aluminum tubing, Design, Construction, Costs.)

This investigation is an extension of the work reported in Biotechnology Laboratory Technical Report No. 14 by Jeremy Crocker and John Lyman, entitled Study of a Small Heat Chamber Capable of Rapid, Programmed Increases and Decreases in Temperature. Although this study has not reached completion, the following design configuration seems indicated: A vertical cylindrical chamber six feet high with a six foot diameter, constructed of aluminum tube sheet. This allows for a silicone-base fluid to circulate in the walls in order to attain a maximum temperature of 600 F at the rate of 100 F per minute. The initial fluid flow equations had to be reworked due to the tube sheet construction. A preliminary equation has been derived to permit a cost minimization considering various parameters. The actual calculations will be performed on a Bendix G-15 computer. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-263 977 Div. 31, 18
(TIPSB/CCH) OTS price $3.60

Army Transportation Board, Fort Eustis, Va.
FIRE AND SALVAGE KIT (LCM(6)).
Final rept. of Service Test.
1961, 33p. incl. illus. (Rept. no. TCB-59-018-ST)
Unclassified report

DESCRIPTORS: (*Landing craft, Marine corps, Maintenance equipment, Salvage.) (Tests of Test equipment, Anchors, Fire pumps, Diving suits, Tool kits, Electric machinery.)

Investigation was undertaken to determine the suitability of the test item to perform its mission as a fire and salvage vessel under normal and adverse conditions, to obtain operational and maintenance data for evaluating the performance of the Fire and Salvage Kit (LCM(6)); to determine possible deficiencies in design in order that corrective action may be taken prior to classification action; and to give field units an opportunity to suggest improvements for future models, based on operational experiences with the Fire and Salvage Kit. The performance of the fire and salvage vessel demonstrated that the vessel is not fully capable of performing its mission under both normal and adverse conditions. The weight and location of the fire and salvage kit affect the trim of the vessel adversely and make it difficult to handle. (This could be highly dangerous in an adverse situation.) The components of the fire and salvage kit proved satisfactory. (Author)

AD-264 684 Div. 31
(TIPSE/VB) OTS price $3.60

General Applied Science Labs., Inc., Westbury, N. Y.
PROPELLER BLADE VARIATION EXPERIMENTS,
by S. Slutsky and J. Tamagno. June 61, 32p. incl. illus. table (Technical rept. no. 213)
(Contract Nonr-303100, Proj. S-R 009 01 01)
Unclassified report

DESCRIPTORS: (Marine propellers, *Propeller blades, *Vibration, Tests.) (Vibration, Frequency, Measurement, Test methods.) Transducers.

An experimental program was carried out to determine the mode shapes and frequencies of a model of a typical naval propeller. The purpose of this program is to make available detailed relevant data to be used for evaluating the results of a parallel theoretical and numerical program of vibration and stress analysis of practical naval propellers. Tests carried out with both piezoelectric and capacitance probes gave practically identical results which indicated the necessity of further extension of the numerical program, and, in particular, a large increase in the number of degrees of freedom used. It was also noted that interblade coupling through the hub produces a splitting of the single blade frequencies into several frequencies (theoretically four) with a maximum separation (in air) of about 10%. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-263 929 Div. 32, 2
(TIPSP/GRW) OTS price $10.50

National Research Council, Washington, D. C.
ECONOMIC-GEOGRAPHIC REORIENTATION IN WESTERN FINNISH KARELIA: A RESULT OF THE FINNO-SOVIET BOUNDARY DEMARCATIONS OF 1940 AND 1944.
Doctoral thesis,
by Ronald Arthur Helin. Apr 61, 124p. incl. illus. tables, 237 refs. (NRC publication no. 909; Foreign Field Research Program rept. no. 13)
(Contract Nonr-230009; In cooperation with California U., Los Angeles)
Unclassified report

DESCRIPTORS: (*Economic conditions, *Geography, Commerce, Population, Finland, USSR.)

Contents:
The Finnish-Karelian marchland
Land and man in the Etela-Saimaa
Expansion of urban functions as a result of the boundary displacement
Industrial activity and the new state line
Reorientation of commercial traffic
Rural resettlement
Dislocation in the immediate boundary environs of the South-Saimaa littoral
A new order in the Sovietized portions of the Etela-Saimaa

AD-264 041 Div. 32, 30
(TIPSB/CCH) OTS price $5.60

Princeton U., N. J.
PREFERENCE ANALYSIS: A GENERAL METHOD WITH APPLICATION TO THE COST OF LIVING INDEX,
by S. N. Afriat. 14 Aug 61, 52p. incl. tables, 10 refs. (Research memo. no. 29)
(Contract Nonr-185816)
Unclassified report

DESCRIPTORS: *Economics, Costs, Mathematical analysis, *Computers, Theory.

AD-264 311 Div. 32
(TIPSB/LH) OTS price $6.60

George Washington U., Washington, D. C.
WOMENPOWER AND ECONOMIC GROWTH: AN ANALYSIS OF STATE DATA, 1890-1950,
by Sheldon E. Haber. 25 Sep 61, 67p. incl. tables (Serial T-114/60)
(Contracts Nonr-76105, Proj. 047 001 and Nonr-76106, Proj. 347 008)
Unclassified report

DESCRIPTORS: (*Women, Personnel, Labor, *Economics, Data, Statistical analysis.)

An attempt is made to evaluate through empirical evidences, factors which have been cited as influencing in a significant manner, the long-term growth in the proportion of women in the labor force. It is hoped thereby that some insights into the growth of the work force and womenpower availability will be gained. The present study differs from previous ones in several aspects: (1) the data utilized are for the forty-eight states (excluding Alaska and Hawaii) providing a large sample of diverse experiences and (2) only the gainful activity of white women is considered. The bench mark dates for this study are 1890, 1920, and 1950. Among the variables examined in terms of their cross-section and time series patterns in relation to those in the white female labor force participation rate are the following: the proportion of foreign born among white women, the proportion of married women among white women, urbanization, changes in family size, and changes in employment opportunities as measured by shifts in the industrial composition of the labor force. The basic statistical techniques used in the study are that of rank correlation and standardization. (Author)

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterisk will be included in the cumulative indexes.

ASTRONOMY

PB 155 433 $3.60

Aeronautical Research Lab., Air Force Research Div., Wright-Patterson AFB, Ohio.
LIGHT AMPLIFICATION AND ITS USEFULNESS IN ASTRONOMICAL OBSERVATIONS, by Radames K. H. Gebel. Rept. on Research on the Quantum Nature of Light. Nov 60, 37p. 7 refs. WADC Technical note 59-290; AD-249 692.

DESCRIPTORS: *Nebulae, Detection, Photographic emulsions, *Light, Amplifiers, Television, *Television equipment, Mars, Astronomy.

Some limitations in detecting extragalactic nebulas using conventional photographic emulsions are investigated. The applicability of the present state-of-the-art in light amplification, using the closed circuit television system, for detecting such nebulas is analyzed. The possible use of the latter system for Mars observations is discussed. (Author)

BEHAVIORAL SCIENCES

Human Engineering

PB 153 945 $4.60

Army Medical Research Lab., Fort Knox, Ky.
THE EFFECT OF THE SPATIAL POSITION OF A CONTROL ON THE STRENGTH OF SIX LINEAR HAND MOVEMENTS, by Lee S. Caldwell. Rept. on Psychomotor Studies. 30 Dec 59, 46p. 6 refs. Rept. no. 411; AD-232 502.

DESCRIPTORS: *Control sticks, *Hands, Motion, *Human engineering, *Psychomotor tests, Dynamometers, Statistical analysis, Arms, Polynomials.

The effects of the distance, angular elevation, and lateral position of an isometric control on the strength of six linear hand movements were determined. The control distance exerted a stronger influence on the output of the operator than did either of the other spatial variables. The up, down, left, and right movements were strongest at the near control positions. Pull increased in strength as the control distance was increased but push increased with distance to the 20-in. position and then decreased. The angular elevation of the control had no significant effect on the up and right movements. Down and push were strongest at the intermediate elevations, left was strongest at the lowest elevation, and pull was strongest at the highest and lowest elevations. The lateral position of the control had no appreciable effect on the up and pull movements. Left and right were strongest when the handle was directly in front of the shoulder; but down and push were strongest when the control was at the 30° lateral positions. (Author)

PB 134 204 $1.10

Naval Research Lab., Washington, D. C.
THE EFFECTS OF MAGNIFICATION AND AVERAGE COURSE VELOCITY ON COMPENSATORY TRACKING, by J. H. Bowen and Rube Chernikoff. 11 Aug 58, 8p. 7 refs. NRL rept. 5186.

DESCRIPTORS: *Tracking, Errors, Psychology, Display systems, Human engineering, Control systems.

This experiment investigated the relationship between magnification, average course velocity, and system error in a compensatory position-control tracking system. Course inputs, each consisting of single sine waves (2, 8, and 30 cycles per minute) with appropriate frequency-amplitude combinations, were used to generate three values of average velocity V_k of 10, 30, and 90 units. The following results were obtained: (1) Both with and without magnification, system error formed an invariant relationship with average course velocity over a wide range of course frequencies. There were reliable, though small, deviations from invariance at the lowest frequency course for the high- and low-velocity levels. (2) Display magnification reliably reduced system error by approximately equal amounts for $\overline{V}_k = 10$ and 30. For the index of 90, magnification degraded system performance with the low-frequency course, producing no effects with other frequencies. (3) System error was some increasing function of the velocity indices. The departures from a linear relationship were not large. (Author)

Personnel and Training

PB 155 868 $7.60

Human Resources Research Office, George Washington U., Washington, D. C.
THE DETERMINATION OF COMBAT JOB REQUIREMENTS FOR TANK PLATOON LEADER AND TANK PLATOON SERGEANT, by Eugene G. Roach and Robert A. Baker (Army Armor Human Research Unit, Fort Knox). Technical rept. 69; AD-254 701.

DESCRIPTORS: *Military training, Combat, *Job analysis, Leadership, Training, Military requirements, Military personnel.

To analyze the job requirements for tank platoon leaders and sergeants, and to determine the relative importance of the job activities in combat, a master list was prepared on the basis of relevant literature and interviews with key personnel. The jobs in the list

were rated by several hundred armor officers and non-commissioned officers in TOE units. A final list of jobs which they considered essential in combat was staffed, and prepared for use by the Army as a basis for determining the content of relevant curricula and proficiency tests, and for expanding the description for MOS 131.7. (Author)

AD-256 392 $3.60

Human Resources Research Office, George Washington U., Washington, D. C.
DEVELOPMENT AND EVALUATION OF A PROGRAM OF INSTRUCTION IN BASIC LAND NAVIGATION, by Joseph F. Follettie (Army Infantry Human Research Unit, Fort Benning, Ga.). Rept. on Contract DA-49-106 qm-1. May 61, 32p. 11 refs. Technical rept. 70.

DESCRIPTORS: *Military training, Terrain, *Navigation, Military personnel, Maps, Map reading, Tests, Effectiveness, Position finding.

This report describes development and evaluation of a 12-hour Program of Instruction in basic land navigation, for use in Army Basic Combat Training (ATP 21-114). The specification of a performance requirement for basic land navigation by enlisted personnel is summarized in an appendix. The experimental program of instruction, which was built around instruction in dead reckoning and map-terrain association, is outlined. A sample of basic trainees was trained by the POI and tested on a night proficiency test, with about 75 per cent of the sample meeting the performance requirement. (Author)

AD-256 572 $1.60

Institute for Social Research, U. of Michigan, Ann Arbor.
SOME PROPERTIES OF THE MEASURES OF SCIENTIFIC OUTPUT, by Donald C. Pelz and S. Stewart West. Interim technical rept. (Analysis memo. no. 9) on Stimulating and Inhibiting Factors in Scientific Performance: Partial Support, Grant no. DA-ORD-31-124-61-G18. 15 Dec 60, 11p. OOR rept. no. 0010:1.

DESCRIPTORS: Scientific personnel, Reports, Production, *Scientific reports, *Patents, Statistical analysis, Analysis of variance.

The output of various scientific products (papers, patents, books, unpublished reports) for scientists differing in education, location, and age was examined. Many of these distributions approximate a lognormal distribution--i.e., the logs of the various products tend to fit closely the normal distribution. These distributions can be described adequately by a single parameter, the mean; other parameters (median, standard deviation) bear a fixed relation to the mean. In log units to the base e, standard deviations of all distributions are close to 1.0. These properties permit a convenient transformation which will permit use of statistical tests (t-test, analysis of variance) which assume normality and homoscedasticity (equality of variance). (Author)

PB 158 293 $3.60

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
CONTEXT EFFECTS IN JOB EVALUATION, by Joseph M. Madden. Oct 60, 37p. 10 refs. WADD-TN-60-220; AD-249 950.

DESCRIPTORS: *Job analysis, Statistical analysis, Air Force, *Reasoning.

Judgments may be distorted by a variety of influences. One potent influence is the context in which the object judged is placed. When a list of jobs is being evaluated in a job-evaluation program, each job is presented to the rater in the context of all the remaining jobs on the list. This study demonstrates that jobs may be listed together in such a way as to seriously bias evaluation scores. When a list was composed of all high-value jobs, the obtained evaluation scores were lower than the true ones. When a list was composed of all low-value jobs, the evaluation scores were higher. On lists containing a majority of high-value jobs, the low-value jobs were judged even lower; and the reverse was true when the list contained a majority of low-value jobs. Other types of context effects were also observed. Suggestions were made for the control of context effects in the Air Force job-evaluation program. (Author)

PB 158 294 $1.10

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
EFFECT OF DEGREE OF FAMILIARITY IN JOB EVALUATION, by Raymond E. Christal and Joseph M. Madden. Nov 60, 9p. 9 refs. WADD-TN-60-263; AD-250 118.

DESCRIPTORS: Job analysis, Factor analysis, Perception, *Reasoning, *Aviation personnel, Classification

A significant association between the familiarity of the rater with a job and the ratings he assigns to the job was found for 17 of 50 Air Force specialties. Assuming that the most valid ratings are those given by highly familiar raters, it appears that highly technical jobs tend to be under-evaluated by raters who are unfamiliar with the work performed. On the other hand, some jobs tend to be over-evaluated by raters who are unfamiliar with the work performed. These findings point to the necessity for controlling the level of familiarity when job evaluation is conducted. (Author)

PB 158 295 $1.60

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
A NOTE ON THE RATING OF MULTIDIMENSIONAL FACTORS, by Joseph M. Madden. Oct 60, 11p. 9 refs. WADD-TN-60-258; AD-249 951.

DESCRIPTORS: *Job analysis, *Factor analysis, *Reasoning, Air Force, Reliability, Education, Aviation personnel.

To determine how the reliability of ratings is affected by fractionating a multidimensional rating factor, the

complex job-evaluation factor, Knowledge, was split into four simpler factors: Formal Education, Special Education, On-the-Job Training, and Work Experience. Aviation cadets' ratings of 42 Air Force specialties on these four factors were somewhat more reliable than ratings on the original multidimensional Knowledge factor. Maximum reliability of rater judgments is suggested as one criterion for the most desirable level of fractionation of a complex factor. (Author)

PB 156 567 $1.60

Purdue Research Foundation [Lafayette, Ind.]
EFFECT OF AMOUNT OF JOB INFORMATION REQUIRED ON RELIABILITY OF INCUMBENTS' CHECK-LIST REPORTS, by E. J. McCormick. Rept. on Contract AF 41(657)237. July 60, 16p. 4 refs. WADD-TN-60-142; AD-246 439.

DESCRIPTORS: *Job analysis, Reliability, Aviation personnel, Statistical analysis, Analysis of variance, Test methods.

The effect the number of questions asked about each task had upon the consistency and amount of information provided by Air Force personnel when completing task inventories was measured. Aircraft Control and Warning Operators (AFSC 27350) were asked to report, by means of a task check list, various combinations of the following information: (1) the occurrence of tasks; (2) the frequency with which the task was performed; (3) the time required; and (4) the judged mental difficulty of the tasks. Fifty-six airmen were randomly assigned to each of four experimental groups. Each group was administered one of four combinations of the four types of information. Analysis of variance showed no systematic differences in the number of tasks reported by incumbents who were asked to report one, two, three, or four types of information about such tasks. Incumbents who were required to report more (as opposed to fewer) types of information about their tasks generally provided more reliable information. Among the different samples of incumbents there was considerable stability in the number who reported that they performed a particular task. (Author)

Psychology

PB 156 700 $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
STOCHASTIC LEARNING THEORIES FOR A RESPONSE CONTINUUM WITH NON-DETERMINATE REINFORCEMENT, by Patrick Suppes and Joseph Zinnes. Technical rept. no. 34 on Contract Nonr-225(17). 25 Oct 60, 35p. 3 refs. AD-246 070.

DESCRIPTORS: *Learning, Interception probabilities, Statistical analysis, *Sampling.

Extensions of the stochastic learning theories to a continuum of responses are considered for the case of non-determinate reinforcement schedules. The general equations for two types of theories, continuous analogs of the finite linear and stimulus sampling theories, are developed separately. The character of the models are illustrated by applying them to the target experiment. In this experiment, the subjects are instructed to locate or hit an unseen target located at some point on the circumference of a circle. The exact position of the target on each trial is determined by sampling from a fixed distribution defined over the circumference. If the subject's response lies within a specified distance of the target, he is informed that he has a hit; otherwise a miss. The response alternatives are said to lie on a continuum since the subject is free to choose any point on the circumference. The non-determinate aspect of the experiment refers to the fact that the subject is not informed of the exact location of the target after a miss (or a hit).

PB 157 334 $1.60

Florida U. [Gainesville].
STRENGTH OF CONDITIONING AND INTENSITY OF THE CONDITIONED STIMULUS, by H. D. Kimmel, Frances A. Hill, and M. C. Morrow. Technical rept. no. 1 on Transfer of Training Between Sensory Modes, Contract Nonr-580(09). Oct 60, 20p. 7 refs. AD-251 748.

DESCRIPTORS: *Conditioned reflex, *Auditory perception, *Tactual perception, Auditory signals, Electroshock, Intensity, Stimulation, Test methods, Motor reactions, Galvanic skin response, Sensory perception, Transfer of training.

This study investigated the relationship between conditioned stimulus (CS) intensity and strength of conditioning, using two different response measures. The first of these measures was the magnitude of the conditioned galvanic skin response (GSR) to the tone and the second was the latency of finger-withdrawal from a key which delivered the electric shock unconditioned stimulus (UCS). Magnitude of GSR on extinction trials, averaged across the three extinction CS intensities which has been used, was significantly related to intensity of the acquisition CS. The finger-withdrawal data were less unambiguously interpretable and could not be used to support the assertion that acquisition CS intensity was negatively related to latency of conditioned finger-withdrawal or positively related to the number of avoidance conditioned responses. (Author)

PB 155 120 $1.60

Human Engineering Labs., Aberdeen Proving Ground Md.
THE EFFECT OF TWELVE HOURS CONFINEMENT IN STATIC ARMORED PERSONNEL CARRIERS ON SELECTED COMBAT RELEVANT SKILLS: STUDY III, by Samuel A. Hicks, Jimmy P. Scott, and Russell B. Randall. Feb 61, 20p. 5 refs. Technical memo. 1-61; AD-252 338.

DESCRIPTORS: *Military personnel, Separation, *Armored vehicles, Cargo vehicles, Test methods, *Stress (Physiology), *Stress (Psychology), *Psychomotor tests, Statistical analysis, *Human engineering.

Changes in general combat relevant performance as a result of sustained confinement in Armored Personnel Carriers (APCs) were determined as a result of twelve hours confinement in static (stationary) APCs. It was

also intended to determine the extent to which subjects' activity level contributes to the observed decrements. Forty enlisted men were tested both before and after confinement on tests designed to measure stamina, eye-arm coordination, gross motor coordination and rifle accuracy. The twelve-hour confinement period resulted in statistically significant losses in three areas. Recommendations are included for future research. (Author)

AD-255 652 $1.60

Ohio State U. Research Foundation, Columbus.
VALUE ORIENTATIONS AND PREFERENCE FOR A MINIMAX STRATEGY, by Alvin Scodel. Technical note no. 3 on Contract AF 49(638)317. Jan 61, 13p. 9 refs. RF Proj. 808; AFOSR-TN-379.

DESCRIPTORS: (*Personnel, Behavior, Needs, *Personality, Tests, Adjustment (Psychology), Personality tests) *Games theory.

Thirty-five pairs of subjects played a two-person, zero-sum-game with a saddle point. The game ran for 50 trials, and the positions were reversed after the first 25 trials. Each subject had been administered an Allport-Vernon-Lindzey prior to the game. With respect to behavior in the game it was found that the group that was ahead of its opponents at the end of the first half of the game tended to converge more • readily on a minimax strategy when the positions of the players were reversed. Players who inclined toward a minimax strategy were lower on the Theoretical value and higher on the Religious value of the Allport-Vernon-Lindzey than players who avoided such a strategy. The relationships between this study and some other studies involving correlations between values and behavior were briefly discussed. (Author)

PB 157 396 $6.60

Personnel Research Board, Ohio State U., Columbus.
ORIGINALITY IN GROUP PRODUCTIVITY. II. THE EFFECTS OF VARIED EXECUTIVE SANCTIONS UPON PRODUCTIVE INDEPENDENCE IN SUBORDINATE TEAMS, by Pauline N. Pepinsky, Bruce A. Norton, and Harold B. Pepinsky. Rept. on Contract Nonr-495(15). 1960, 67p. 7 refs. AD-246 954.

DESCRIPTORS: *Behaviour, *Group dynamics, Production, Sociology, Psychology, Personality, *Management engineering, Leadership, Mathematical analysis, Reasoning.

This experiment tested the effects upon the manifestation of productive independence by members of a subordinate team, of favorable executive sanction for such behavior. Operationally, the experimental task consisted in successive presentation of stimulus cards of varying ambiguity, each of which required visual discriminations among four alternative sets of components as to which comprised a single integrated figure. In its formal properties, the task resembled many real life situations in that more than one right answer was possible, and that the group was neither always right nor always wrong, but varied in the correctness of its judgment in repeated decisions over time. In addition, attempts were made to present the task in a context that would lead the Ss to see their actions in the experiment as having more than trivial consequences--to take the task seriously. The situation was one in which independence and productivity were, in effect, given as positively correlated; each man was placed in the position of a person whose ability was superior to that of his team. Since his first responses corresponded only by chance to the subsequent feedback, he also found himself in a minority position 75% of the time. (Author)

PB 155 047 $2.60

Quartermaster Research and Engineering Command, Natick, Mass.
THE EFFECT OF EXPOSURE TO HIGH HUMIDITY AT HIGH AND MODERATE AMBIENT TEMPERATURES ON ANAGRAM SOLUTION AND AUDITORY DISCRIMINATION, by B. J. Fine, A. Cohen, and B. Crist. Oct 60, 28p. 17 refs. Technical rept. EP-138; AD-251 918.

DESCRIPTORS: *Reasoning, Humidity, Heat, Temperature, Tests, *Applied pschology, Psychology, Auditory perception, *Achievement tests, Intelligence tests.

Ten subjects were exposed for 6 1/2 hr periods on 4 successive days to ambient dry/wet bulb temperatures of 70/53F, 70/68F, 95/70.5F, and 95/92F, with minimal wind. The 4-day sequence was replicated 4 times during 4 successive weeks, the order of the conditions differing for each replication. Subjects performed an anagram and an auditory discrimination task immediately after entering and just prior to leaving the experimental situation. The intervening time was occupied by group performance of a mental task. The results indicate that there was no increment or decrement in performance on either the anagram or auditory discrimination task that could be attributed to either high temperature or high humidity. (Author)

PB 157 331 $2.60

Tulane U. [New Orleans, La.]
A METHOD OF OBJECTIVE MEASUREMENT OF INTERPERSONAL RELATIONS AND GROUP BEHAVIOR, by George J. Palmer, Jr. Technical rept. 1 on Leadership and Organizational Behavior Test of a Proposed Theory, Contract Nonr-475(08). Oct 60, 26p. 19 refs. AD-248 504.

DESCRIPTORS: Design, *Group dynamics, Measurement, Test methods, Leadership, *Personality tests, Behavior, Theory, Sociometrics.

Some proposals for the measurement and analysis of interpersonal knowledge as a basis for assessing interpersonal and group behavior are presented. Rationale and methods are consistent with the view that, in the social context, a person may be considered to have the roles of (1) a learner-perceiver, (2) a stimulus-information object that is perceptible or knowable, and (3) that these two roles interact, and further (4) that both roles and their interaction vary and interact over time.

PB 158 053 $1.60

Tulane U. [New Orleans, La.]
TESTS OF INTERPERSONAL KNOWLEDGE. SOME DEVELOPMENT CONSIDERATIONS AND SPECIFICATIONS FOR A UNIVERSE OF ITEMS, by George J. Palmer, Jr. Technical rept. 2 on Leadership and Organizational Behavior Test of a Proposed Theory, Contract Nonr-475(08). Nov 60, 14p. 32 refs. AD-248 505.

DESCRIPTORS: *Personality tests, Theory, *Psychology, *Sociometrics, Group dynamics, Test methods, Design, Behavior, Preparation, Leadership.

Some objectives and requirements for construction of tests of interpersonal knowledge are discussed. Discussion of test development problems is related to some of the more important influences to which interpersonal knowledge are expected to be subject. A chart containing suggested sources and references for item writing is presented as an outline for specification of a universe of items. (Author)

BIOLOGICAL SCIENCES

PB 158 117 $1.10

University of Southern California, Los Angeles.
A STUDY OF MARINE BIOLOGY OF THE NORTH POLAR BASIN, by J. L. Mohr. Rept. on Contract Nonr-228(19). [1960] 3p.

DESCRIPTORS: (*Marine biology, Animals, Plants, *Ecology, Soils) (*Arctic regions) (*Marine meteorology, Sedimentation, Temperature, Pressure).

See also AD-260 122.

Anatomy and Physiology

AD-255 181 $3.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
THE EFFECTS OF HYCAR-TREATED UNDERWEAR ON THE PHYSIOLOGICAL PERFORMANCE OF MEN UNDER HEAT STRESS, by A. A. Woodward and E. G. Cummings. Apr 61, 38p. 7 refs. Technical rept. CRDLR-3058.

DESCRIPTORS: (*Protective clothing, *Underwear, Effectiveness, Tests, Impregnation) (*Stress (Physiology), *Heat, Body temperature, Metabolism, Perspiration, Humidity, Measurement) (Military personnel, Protective clothing, Exercise, Climatic factors)

Men were tested in a hot room at 100°F and 29% relative humidity while wearing (a) a nonprotective utility costume, (b) a standard, permeable, protective costume, and (c) an experimental, permeable, protective costume that differed from the standard only in the experimental absorbent underwear. Body temperatures, heart rates, sweat-evaporation rates, and metabolic rates of the subjects were measured. No evidence was found that substitution of the experimental underwear for the standard underwear had any effect on the heat stress of the subjects, whether they exercised at low, medium, or high workloads. The fit of the underwear caused discomfort in some subjects. (Author)

PB 156 256 $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
PULMONARY SURFACE TENSION AND ALVEOLAR STABILITY, by J. A. Clements, R. F. Hustead and others. Mar 61, 25p. 21 refs. CRDLR 3052; AD-254 311.

DESCRIPTORS: *Lungs, Surface tension, Theory, Respiration, *Physiology, Stability, Volume, Pressure, Test methods, Measurement, Air.

Human and rat lungs were degassed and filled with air and a physiological salt solution for determining pressure-volume relationships. Extracts were prepared from the specimens and examined for their surface film-forming activity. Both the aeration of the alveolar structure of the lungs at functional residual pressure and the surface activity of the extracts showed wide variations. Numerical ratios were defined to express these two properties quantitatively, and a high degree of correlation was observed between them. The range of correlation was extended by treating the rat lungs with nonionic detergents. These findings support the hypothesis that the stability of the pulmonary alveolar structure is dependent on intrinsic surface-active material, and they have encouraged further attempts at formulating a theory of alveolar mechanics, taking surface forces into account. A theory is presented and some of its weaknesses are pointed out. It is concluded that the state of surface-active material in the pulmonary alveolar structure profoundly affects the aeration and, hence, the functional properties of the lungs. (Author)

AD-255 592 $3.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
GRAVITY PROBLEMS IN MANNED SPACE STATIONS, by Carl C. Clark and James D. Hardy. Rept. no. 8 on Proj. MR005.15-0005.6. 29 Mar 61, 33p. 71 refs. NADC-MA-6033.

DESCRIPTORS: (*Weightlessness, *Space environmental conditions, Rotation, *Space flight, Space medicine, Man, Motion, Gravity, Velocity), (Satellites, Satellite vehicle research, Manned, *Extraterrestrial bases).

Unpowered flight above an atmosphere will produce weightlessness throughout a non-rotating space vehicle or along the axis of rotation of a rotating vehicle and if man is to live in space stations the relative merits and problems of living in a gravitational or in a weightless environment must be resolved. Four points concerning this problem are emphasized: (a) Restraint systems, both for man and for moveable objects, will have to be developed for use in the weightless (zero G) state; (b) In a rotating space station, velocities of linear or angular motions of the head may have to be kept of low

magnitude by using restraints and possible eye prism devices, mirror walls, etc., to reduce the need for head motions, to avoid disorienting illusions and nausea; (c) Normal growth of the embryo and the young and normal repair of adult tissues, such as bone and muscle, which are affected in cellular patterns by force distributions, may require artificial gravity; (d) it may be necessary to develop exercises and other procedures to use prior to changes of acceleration level to restore or develop tolerance to the new level in spite of acclimatization to the old level. (Author)

AD-255 596 $1.10

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A METHOD FOR THE COMPUTATION OF AORTIC DISTENSIBILITY IN THE LIVING HUMAN PATIENT, by Freeman W. Cope. Rept. no. 8 on Proj. MR 005.13-8003.1. 3 Apr 61, 9p. 3 refs. NADC-MA-6109.

DESCRIPTORS: (Man, Heart, Circulatory systems, Blood pressure, Measurement), (*Aorta, Arteries, Test methods), *Medical research (*Equations, Computers)

The detailed equations are given for the computation of aortic distensibility in the intact living human patient from measurements of systolic and diastolic blood pressure, heart rate, and cardiac output. A brief outline of the derivation of these equations is also given. (Author)

AD-261 354 $8.10

Haskins Labs., New York.
AUDITORY SIGNALING: ABSOLUTE IDENTIFICATION AND DISCRIMINATION OF SPEECH AND NON-SPEECH SOUNDS, by Katherine S. Harris, Alvin M. Liberman and Peter Eimas. Final rept. on Contract AF 19(604)2285. July 61, 86p. 58 refs. ESD TR 61-30.

DESCRIPTORS: (*Speech, Sound, Identification, Stimulation, Perception, *Learning, Theory), *Auditory signals, *Auditory perception, Acoustics.

With synthetic speech stimuli that varied along an acoustic continuum and were heard as consonants, it was found (1) that discrimination is more acute across phoneme boundaries than within phoneme categories, and (2) that perception is nearly categorical in that discrimination is little better than would be predicted on the extreme assumption that the listeners can only hear the sounds as phonemes and can discriminate no other differences among them. By comparing discrimination of the speech-sound variables and the same variables in non-speech contexts, evidence was found that the discrimination peaks are learned, and that the learning consists entirely of an increase in acuity. If speech is perceived by reference to articulation, the perception of some consonants would be categorical because the articulation is categorical, but vowel perception should be different, since articulation can be continuous from phoneme to phoneme. An experiment confirmed that vowel perception is non-categorical: there are no peaks at phoneme boundaries, and discrimination is much better than expected on the assumption that the sounds can only be heard as phonemes. Mimicry of synthetic consonants provided further support for the above articulatory hypothesis: the speech gestures in mimicry are no less categorical than the perceptions. (Author)

AD-260 673 $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
EFFECTS OF VARYING MODE OF SIGNAL PRESENTATION ON HEARING THRESHOLDS OBTAINED WITH BEKESY-TYPE AUDIOMETER, by George J. Harbold and William F. O'Connor. 1960, 18p. 14 refs. BuMed Proj. no. MR005.13-2005, rept. no. 9.

DESCRIPTORS: *Hearing, *Auditory thresholds, Audiometers, Signal-to-noise ratio, *Audiometry, Automatic, Psychology, *Auditory acuity, Frequency, Analysis of variance, Instrumentation, Naval personnel, Aviation personnel, Tests.

Certain operational variables of a Grayson Stadler Type E-800 Bekesy audiometer were evaluated. Seventeen naval aviation cadets served as subjects, and each responded to all the selected modes of signal presentation; namely (1) speed (fast and slow); (2) tone (steady and pulsed); and (3) direction of frequency change (ascending descending). Mean hearing thresholds differed as a result of varying the modes of signal presentation; however, the mean variations did not exceed the clinically accepted range of plus or minus 5 db. Data were also treated by analysis of variance which showed statistically significant differences and interactions among some of the operational variables. (Author)

PB 154 964 $1.10

Quartermaster Research and Engineering Command, Natick, Mass.
THE LIMITING HAND SKIN TEMPERATURE FOR UNAFFECTED MANUAL PERFORMANCE IN THE COLD, by R. E. Clark. Feb 61, 9p. 4 refs. Technical rept. EP-147; AD-253 309.

DESCRIPTORS: *Hands, Skin, Measurement, *Body temperature, *Exposure, Temperature

The hands of 12 enlisted men were cooled to 55 F and 60 F surface temperature on different experimental days. Performance times to complete a standard knot tying task were obtained when subjects' hands first reached the appropriate hand skin temperature, after 20 minutes exposure at the criterion temperature, after 40 minutes exposure, and after 60 minutes exposure. It was found that performance was severely hindered when hand skin temperature fell to 55 F, and that performance decrements at this skin temperature level were increasing exponential functions of duration of exposure, becoming asymptotic after about 40 minutes exposure. In contrast, performance at 60 F hand skin temperature remained unaffected throughout the exposure period. (Author)

Biochemistry

PB 153 926 $1.60

Army Medical Research Lab., Fort Knox, Ky.
DISTRIBUTION OF INJECTED CORTISOL AND CORTICOSTERONE IN INTACT AND ADRENALECTOMIZED RATS, by P. F. Gulyassy, F. DeVenuto, and U. Westphal. Rept. on Biochemistry of Steroid Hormones in Stress. 29 Dec 59, 16p. 26 refs. Rept. no. 413; AD-232 503.

DESCRIPTORS: *Labeled substances, *Corticosteroids, Carbon, *Adrenal glands, Excision, Excretion, Inhibition, Biochemistry, Hormones, Metabolism

Injection of cortisol-4-C^{14} into adrenalectomized rats resulted in a slower elimination of radio-active material from the organism than in normal rats. The finding was related to a constant displacement of the tissue cortisol by endogenous corticosteroids, an interpretation corroborated by additional experiments in which, in addition to cortisol-4-C^{14}, repeated doses of non-radioactive corticosterone were injected. These injections simulated the endogenous production of the steroid. The study results are interpreted on the basis of competitive binding of steroids to various binding sites in the body. (Author)

PB 153 927 $1.60

Army Medical Research Lab., Fort Knox, Ky.
STUDIES ON THE ANTIPROTEOLYTIC ACTIVITY OF HUMAN BLOOD, by M. Greenberg, W. F. Blatt, and H. Jensen. Rept. on Biochemistry of Hemorrhage and Trombosis. 2 Feb 60, 19p. 16 refs. Rept. no. 414; AD-232 504.

DESCRIPTORS: *Blood, Biochemistry, Inhibition, Trypsin, Fractionation, *Enzymes, Hemorrhage, Physiology.

Three antiproteolytic fractions were isolated from human plasma Fractions IV.1 and IV.4. One fraction primarily inhibited trypsin with little or no antiplasmin activity, the second appeared to be capable of inhibiting both trypsin and plasmin while the third was primarily a plasmin inhibitor. Concentration, rate, pH and heat stability studies were performed in an attempt to establish the separate identities of these three components. The fraction possessing antitrypsin as well as antiplasmin activity has not as yet been demonstrated to be an entity; it may represent an admixture of the singular antitrypsin and antiplasmin fractions. (Author)

AD-255 594 $1.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A LOGARITHMIC INTEGRATOR FOR THE SPACKMAN-STEIN-MOORE AMINO ACID ANALYZER, by Freeman W. Cope. Rept. no. 14 on Proj. MR 005.15-0002.7. 14 Mar 61, 16p. 3 refs. NADC-MA-6103.

DESCRIPTORS: Instrumentation, *Electronic integrators, Amino acids, *Chromatographic analysis, Functions, Design, Theory, Reliability, Automatic, Integration.

This report describes a simple electro-mechanical system for automatic integration of the amino acid peaks obtained from the Spackman-Stein-Moore amino acid analyzer. The system uses a mechanical logarithm computer followed by an electronic integrator. Using this instrument, one can perform the integrations in one quarter or less of the usual time. The system shows good accuracy and reproducibility, and is relatively easy and cheap to build. (Author)

PB 158 102 $1.10

New York State Psychiatric Inst., N. Y.
METABOLISM OF GLUTATHIONE, GLUTAMINE, AND ASPARAGINE, by Heinrich Waelsch. Annual progress rept. for 1 Jan-31 Dec 60 on Contract Nonr-369(00). 4 Nov 60, 3p. 4 refs. AD-246 049.

DESCRIPTORS: (*Glutathione, *Glutamine, *Aspartic acid, *Metabolism) (*Nervous system, Ammonia, Metabolism, Cholinesterase, *Enzymes, Inhibition), *Brain, Tissues (Biology), *Proteins, Biosynthesis.

During ammonia infusion, the glutamine concentration of the brain doubles while the concentration of the other members of the glutamic acid family stays constant. Experiments carried out with $C^{14}O_2$ clearly indicate the ability of brain tissue to fix CO_2 into the members of the citric acid cycle. This finding might suggest that the effect of CO_2 on the activity of neurons may not be solely a pH effect but a stimulation of the citric acid cycle and thereby increased energy generation. The effect of cholinesterase inhibitors and resynthesis of the inhibited cholinesterase in the nervous system of the turnover of proteins in the caudate nucleus of the rat was studied. It was found that as a consequence of inhibition the turnover of the proteins in this area increases up to fourfold. It was found that transglutaminase in the absence of amines is able to cleave ammonia from the amide groups of protein bound glutamine. This finding indicates a new source of tissue ammonia hitherto unsuspected. A large number of glutamine peptides were synthesized containing not more than 2 - 4 amino acids in addition to glutamine which act as substrates of transglutaminase.

Radiobiology

ANL-6368 $3.00

Argonne National Lab., Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Summary rept. Jan-Dec 60, on Contract W-31-109-eng-38. May 61, 217p.

ACRH-15 $2.75

Argonne Cancer Research Hospital, Chicago, Ill.
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION, ed. by Leon O. Jacobson and Margot Doyle. Rept. on Contract AT(11-1)-69. Mar 61, 152p.

TID-13318 $1.10

Brookhaven National Lab., Upton, N. Y.
DIAGNOSTIC AND THERAPEUTIC USE OF RADIOISOTOPES IN THE CENTRAL NERVOUS SYSTEM OF MAMMALS. Bibliography. Aug 61, 9p.

HW-70552 $0.50

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, APRIL-JUNE, 1961, ed. by I. C. Nelson. Rept. on Contract AT(45-1)-1350. Aug 61, 21p.

UCRL-9755 $2.75

Lawrence Radiation Lab., U. of California, Berkeley.
SELECTIVE BETA IRRADIATION OF THE LYMPHATIC SYSTEM USING INTERNALLY ADMINISTERED Y^{90} DTPA: KINETICS, DOSIMETRY AND BIOLOGICAL EVALUATION, by Harry S. Winchell. Rept. on Contract W-7405-eng-48.

TID-12999 $1.10

New York U., N. Y.
HISTOCHEMICAL AND BIOLOGICAL ALTERATIONS FOLLOWING WHOLE BODY X-IRRADIATION. Progress rept. Sep 60-June 61, on Contract AT(30-1)-1680.

TID-3562 $2.50

Office of Technical Information, Atomic Energy Commission, Washington, D. C.
COBALT IN BIOLOGICAL METABOLISM, comp. by Charlie M. Pierce. 124p.

CHEMISTRY

AD-256 348 $8.10

Forest Products Lab., Madison, Wis.
FUNDAMENTAL STUDIES ON THE CHARACTERIZATION OF NITRATING PULPS, by M. A. Millett, F. J. Masuelli (Feltman Research Labs.) and others. Final rept. on Stability Studies on Cellulose Nitrate. Dec 60, 83p. 24 refs. Rept. no. WC-24.

DESCRIPTORS: *Cellulose nitrates, Stability, *Nitrocellulose, *Wood pulp *Propellants, Test methods, *Nitration, Reaction kinetics, Deterioration, Temperature, Transducers, Decomposition.

The results are presented of a detailed survey of research on the development of an improved Taliani procedure for evaluating the stability of cellulose nitrates, and on the application of this procedure to a study of the kinetics of the thermal degradation process. Also included are data on the carbohydrate composition and thermal stability of a series of experimental nitropulps.

HW-59147 $1.00

Hanford Atomic Products Operation, Richland, Wash.
DISTRIBUTION OF THE ACTINIDE ELEMENTS IN THE MOLTEN SYSTEM: KCl-$AlCl_3$-Al, by R. H. Moore and W. L. Lyon. Rept. on Contract AT(45-1)-1350. Oct 59, 33p.

PB 158 055 $1.60

University of Southern California, Los Angeles.
SOME EFFECTS OF BORON LEWIS ACIDS UPON METHYLTIN COMPOUNDS, by Anton B. Burg and John R. Spielman. Technical rept. no. 8 on Contract Nonr-228(13). 30 Nov 60, 11p. 15 refs. AD-247 766.

DESCRIPTORS: *Metalorganic compounds, Alkyl radicals, Tin, *Tin compounds, Sodium compounds, Salts, Boron compounds, Fluorides, *Methyl radicals, Inorganic substances, *Acids, Chemical reactions.

The salt $NaSn(CH_3)_3$ in liquid ammonia reacts with $H_3NB(CH_3)_3$ in such a manner that yields of $Sn_2(CH_3)_6$ above 90% are obtained upon warming to room temperature. However, when $NaSn(CH_3)_3$ reacts with BF_3 or $(CH_3)_2BF$ in diethyl ether, the yields of $Sn_2(CH_3)_6$ are far smaller. The main reason is found in the catalytic disproportionation of $Sn_2(CH_3)_6$ by these Lewis acids, producing methyltin polymers and tetramethyltin; then BF_3 reacts with the latter to make CH_3BF_2 and the new compounds $(CH_3)_3SnBF_4$ (m.p. 89°, dissociable with liberation of BF_3). The decomposition of $(CH_3)_3SnH$ to H_2 and $Sn_2(CH_3)_6$ is catalyzed by diborane, which also is an effective catalyst for the disproportionation of $Sn_2(CH_3)_6$. (Author)

Analytical Chemistry

LAR-54 $4.60

Denver U. Research Inst., Colo.
INVESTIGATION OF HYDRIDING CHARACTERISTICS OF INTERMETALLIC COMPOUNDS. Quarterly rept. no. 3, 1 Apr-31 July 61, on Contract AT(33-3)-3. Aug 61, 41p.

HW-67037 $1.60

Hanford Atomic Products Operation, Richland, Wash.
LABORATORY INVESTIGATION OF DECONTAMINATING SOLUTIONS FOR PRESENT REACTORS, by J. E. Mendel. Sep 60, 15p.

Inorganic Chemistry

UCRL-9579 $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
INORGANIC MATERIALS DIVISION ANNUAL REPORT, 1960. Rept. on Contract W-7405-eng-48. Feb 61, 132p.

PB 157 336 $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
MOLTEN CARBONATES. PART VII: MECHANISMS OF OXYGEN PRODUCING REACTIONS IN MOLTEN CARBONATE ELECTROLYSIS, by George J. Janz and Fumihiko Saegusa. Technical rept. no. 11 on Contract Nonr-591(10). Oct 60, 32p. 14 refs. AD-246 625.

DESCRIPTORS: (*Carbonates, Melting, *Electrolysis, Electrochemistry, Chemical reactions) (*Oxygen, Production) (Alkali metal compounds, Chemical reactions).

A study of oxygen evolution in molten carbonate electrolysis with platinum, gold, and silver anodes is reported. The technique and measurement of the steady-state overvoltage in the range of 10 to the 6th to 10 to the 2nd power amp/sqcm current density in a carbonate mixture (Li_2CO_3 : K_2CO_3 : Na_2CO_3 equals 4 : 3 : 3 ; melting point, 397°C) for 500° to 900°C are described.

Organic Chemistry

PB 158 101 $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. ABNORMAL SPLITTING OF ETHYL GROUPS DUE TO MOLECULAR ASYMMETRY, by Paul R. Shafer, Donald R. Davis and others. Technical rept. no. 9 on Contract Nonr-220(26). 1 Nov 60, 6p. 4 refs. AD-246 031.

DESCRIPTORS: (*Ethyl radicals, Hydrogen, Organic compounds, *Spectrographic analysis, *Nuclear spins, Molecular rotation), *Nuclear magnetic resonance.

The spectra of the following compounds are discussed: Cyclopropylmethylcarbinyl ethyl ether (I), acetaldehyde diethyl acetal (II), acetophenone diethyl ketal (III), and ethyl-substituted cyclobutenones (IV). The spectrum for I indicates the nonequivalence of the CH_2 hydrogens, which is due to the asymmetric center at the carbinyl group of the cyclopropylmethyl carbinyl portion; similar behavior was also observed for II, III, and IV. For I, II, and III, the methylene hydrogens of the ethyl groups are not equally coupled to the methyl hydrogens. Assignment of the couplings as 7.35 cps (I) and 6.68 cps (II) give excellent agreement between calculated and observed line positions and intensities.

PB 158 082 $1.60

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
SMALL-RING COMPOUNDS. XXXIII. A STUDY BY NUCLEAR MAGNETIC RESONANCE OF THE EXTENT OF ISOTOPE-POSITION REARRANGEMENT IN THE VAPOR-PHASE PHOTOCHLORINATION OF METHYL-^{13}C-CYCLOPROPANE, by E. Renk, Paul R. Shafer and others. Technical rept. no. 11 on Contract Nonr-220(26). 15 Nov 60, 11p. AD-247 908.

DESCRIPTORS: (Methyl radicals, *Propenes, Monocyclic compounds, Isotopes, Chlorination, *Photochemistry, Spectrographic analysis), *Nuclear magnetic resonance.

Vapor-phase photochlorination of methyl-^{13}C-cyclopropane was found to yield cyclopropylcarbinyl-α-^{13}C chloride and allyl-γ-^{13}C-carbinyl chloride. Within the experimental error of the analytical method (nuclear magnetic resonance spectroscopy), no other ^{13}C-position isomers of the chlorides were formed. (Author)

PB 153 893 $1.60

Naval Research Lab., Washington, D. C.
PHOTODEGRADATION OF HIGH POLYMERS. PART II. VACUUM PHOTOLYSIS OF POLY-α-METHYLSTYRENE, by Suzanne Stokes. 20 Feb 61, 19p. 18 refs. NRL rept. 5591; AD-252 971.

DESCRIPTORS: *Styrenes, *Polymers, *Decomposition, Methyl radicals, Photolysis, Thin films, Polymerization, *Organic coatings, Stability, Ultraviolet radiation, Molecular weight, Solar energy, Solar spectrum.

The photodegradation of thin films of poly-alpha-methylstyrene by near ultraviolet light has been studied in vacuum at 27 and 115 C. Changes taking place during photolysis were followed by determining monomer formation by ultraviolet spectroscopy, residue molecular weight through a measurement of intrinsic viscosity, and volatile products by mass spectroscopy. Quantum yields for chain scission and monomer formation were calculated. The main features of the photolysis were found to be random chain scission in the polymer with subsequent depolymerization of the radicals formed to yield only small amounts of monomer; the kinetic chain length is on the order of 15 in the temperature range studied. (Author)

PB 157 406 $2.60

University of Southern California, Los Angeles.
TETRAMETHYLBIPHOSPHINE: SYNTHESIS, THERMAL CONDENSATION, ETHYLENE ADDITION, BORINE ADDUCTS, AND CONVERSION TO PHOSPHINOBORINE POLYMERS, by Anton B. Burg. Technical rept. no. 7 on Contract Nonr-228(13) and Subcontracts AF 33(616)5434 and 6913. 27 Oct 60, 26p. 12 refs. AD-245 641.

DESCRIPTORS: (*Phosphines, Methyl radicals, *Phosphinoborines, Polymers, Borines, Polymerization, Chemical reactions, Synthesis, Ethylenes, Condensation reactions.)

Tetramethylbiphosphine, $P_2(CH_3)_4$ (m. p. -2; b. p. est. 140 degrees), has been made by various reactions using $(CH_3)_2PH$ or $(CH_3)_2NP(CH_3)_2$, or both. It decomposes above 300, first forming $(CH_3)_2PH$, $(CH_3)_3P$, phosphorus-rich sublimates and non-volatile condensation products of interest from a high-polymer viewpoint.

Physical Chemistry

ARF-3184-10 $1.10

Armour Research Foundation, Chicago, Ill.
SCAVENGING OF RADIOACTIVE AEROSOLS IN CONNECTION WITH NUCLEAR-POWERED SHIPS. Rept. on Contract AT(11-1)-578. Aug 61, 8p.

PB 158 086 $1.10

Louisiana State U., Baton Rouge.
DOUBLE LAYER STRUCTURE AND KINETICS OF FAST ELECTRODE PROCESSES WITH MASS TRANSFER POLARIZATION, by Mitsugi Senda. Technical rept. no. 42 on Contract Nonr-300(00). Nov 60, 10p. 8 refs. AD-248 595.

DESCRIPTORS: Theory, *Electrodes, Ions, *Electrical double layer, *Electrochemistry, Diffusion, Ionic current, Polarization.

It is shown that when the Frumkin correction for kinetic parameters of electrode processes becomes too approximate a Levich type of correction applies to fast processes with mass transfer polarization in the case of repulsion of the discharged species from the double layer. The Frumkin correction seems applicable in general for attraction of the discharged species. These conclusions are compared with those reached by Matsuda and Delahay (J. Phys. Chem. 64:332, 1960) and the approximations made by these authors as well as in this analysis are examined. (Author)

TID-13816 $4.60

Michigan U., Ann Arbor.
ELECTROCHEMICAL REDUCTION OF PYRIMIDINE, CYTOSINE AND RELATED COMPOUNDS: POLAROGRAPHY AND MACROSCALE ELECTROLYSIS, by David L. Smith and Philip J. Elving. Rept. no. 63 on Contract AT(11-1)-70. Sep 61, 41p.

PB 161 609 $2.25

National Bureau of Standards, Boulder, Colo.
A COMPILATION OF THE PHYSICAL EQUILIBRIA AND RELATED PROPERTIES OF THE HYDROGEN-CARBON MONOXIDE SYSTEM, by D. E. Drayer and T. M. Flynn. May 61, 89p. 453 refs. Technical note no. 108.

DESCRIPTORS: *Hydrogen, *Carbon compounds, *Monoxides, Chemical equilibrium, Physical properties, Bibliography, Phase studies, Solids, Vapors, Adsorption, Purification, Impurities, Thermodynamics, Transport properties, Equations of state.

Literature data have been used to calculate K-factors for the hydrogen-carbon monoxide system over the range of 68.2 to 122.2°K and 10 to 225 atmospheres. K-factors are presented graphically for eight isotherms over this range. Published data on the solid-vapor region are presented separately as composition versus pressure at constant temperature. A bibliography of approximately 450 references is also presented on related properties for this system and for the pure components. (Author)

PB 157 398 $7.60

University of Southern California, Los Angeles.
CONDUCTIVIMETRIC STUDIES IN THE SODIUM DECYL-DODECYL SULFATES SYSTEM, by Karol J. Mysels, Raymond J. Otter, and Paz Kapauan. Technical rept. no. 14 on Study of the Properties of Micelles, Contract Nonr-274(00). Oct 60, 71p. 36 refs. AD-245 351.

DESCRIPTORS: (Electrolytes, Solutions, Electrical properties, Electrical conductance, Measurement Sulfates, *Electrochemistry, *Colloids).

Contents:
Conductivity of mixed sodium decyl and dodecyl sulfates - the composition of mixed micelles
Thermodynamic aspects of mixed micelles - application to an empirically established equilibrium
Electric conductivity of sodium decyl sulfate solutions
Appendix: Conductivity data

EARTH SCIENCES

PB 158 051 $1.60

Marine Physical Lab., Scripps Institution of Oceanography, San Diego, Calif.
ARTEMIS REMOTE INDICATING SAVONIUS ROTOR CURRENT METER, by Daniel K. Gibson and Victor C. Anderson. Rept. on Contracts Nonr-2216(05) and Nonr-266(66). 1 Nov 60, 16p. 2 refs. SIO Reference 60-54; ARTEMIS rept. no. 13; AD-248 049.

DESCRIPTORS: Meters, Water, Velocity, Oceanography, *Ocean currents, *Instrumentation, Measurement, Recording devices.

A complete system for the measurement and remote recording of water current velocities down to one-tenth ft per sec in water depths to 1000 fathoms is described. All electrical mechanical drawings, a discussion of theory of operation and step-by-step assembly procedures are included to enable any laboratory to duplicate this system. (Author)

Climatology and Meteorology

PB 157 948 $4.60

Flight and Engineering Test Group, Wright Air Development Div., Wright-Patterson AFB, Ohio.
TURBULENCE AND RADAR PHOTOGRAPHIC STUDIES OF THUNDERSTORMS, by Arthur R. Wicker. Rept. on High Level Thunderstorms. Jan 61, 50p. WADD Technical note 60-303; AD-254 099.

DESCRIPTORS: *Thunderclouds, Turbulence, *Storms, *Meteorological radar, Airborne, Meteorological data, Weather forecasting, Gusts, Training planes.

Flight tests were made to obtain storm gust information and to correlate the severity levels of the storms

with radarscope pictures taken of the storm. This program was part of an over-all effort to collect basic data on thunderstorm structure and associated weather phenomena at medium and high altitudes. With proper interpretation, airborne radar can reveal whether a small localized storm is building or dissipating in severity. However, no correlation between radar presentation and specific severity levels could be determined. (Author)

HW-70135 $4.60

Hanford Atomic Products Operation, Richland, Wash.
FEASIBILITY OF PRECIPITATION AND CLOUD SCAVENGING EXPERIMENTS AT HANFORD, AND PERTINENT CLIMATOLOGY, by R. J. Engelmann. Rept. on Contract AT(45-1)-1350. Nov 60, 44p.

AD-257 238 $11.50

McGill U. (Canada).
THE STRATOSPHERIC WIND REGIMES OF THE 1958-59 WINTER. 80 W CROSS SECTIONS; SEA LEVEL TO 35 KM, by Harold A. Steiner. Scientific rept. no. 1, Oct 58-Mar 59, on Contract AF 19(604)8431. Apr 61, 153p. 64 refs. Arctic Meteorology Research Group Pub. in Meteorology no. 41; AFCRL 417.

DESCRIPTORS: *Stratosphere, *Wind, Jet streams (Meteorology), Northern hemisphere, Weather stations, Meteorological charts, Height finding.

Vertical cross sections along the 80W meridian from the surface to 35 km (circa 5 mb) are presented for each fifth day of the 1958-1959 winter season. The synoptic features of the stratosphere - as shown by the cross sections - are discussed in monthly résumés in sufficient detail to furnish a generalized picture of the seasonal changes. An objective method for determining the peak winds in jet streams is formulated and results from this method compare favourably with mesoscale data from aircraft probes. The baroclinity of the troposphere and lower stratosphere and its relation to the Ferrel westerlies are discussed. Boundary conditions for the crests of the Ferrel westerlies on summer and winter type wind profiles are presented and shown to be quasi-permanent in nature. (Author)

PB 155 099 $6.60

Quartermaster Research and Engineering Command, Natick, Mass.
MACRO- AND MICROCLIMATOLOGY OF THE ARCTIC SLOPE OF ALASKA, by John H. Conover. Oct 60, 69p. 19 refs. Technical rept. EP-139; AD-250 549.

DESCRIPTORS: *Micrometeorology, Terrain, Permafrost, Surface properties, Alaska, Meteorological data, Recording devices, Data.

The tundra of the Arctic Slope is characterized in summer by cool maritime winds, much cloudiness, light precipitation, and frequent drizzle. In winter, cloudiness decreases and very cold katabatic winds prevail inland while easterlies continue along the coast. By mid-September a snow cover is generally established; this builds up to depths of 14 to 28 inches in March and April and finally melts in June or July. Microclimatic measurements, including wind speeds, temperatures above and below the ground surface, and depth of thaw profiles, were made near the coast, in the Colville Valley and on nearby slopes, and in the foothills of the Brooks Range. Summer ground-surface temperatures inland averaged in the low 50's while soil was frozen 10-15 inches below the surface. Most of the land was wet in the summer due to the shallow layer of thawed ground. The frequency of surface thaws and freezes was low. Tables of temperature, insolation, wind, and vapor pressure deficit are given. (Author)

PB 155 938 $3.60

Weather Bureau, Asheville, N. C.
CLOUD FREQUENCY BY ALTITUDE AND HOUR OF THE DAY (A CONTRIBUTION TO OCCURRENCE AND INTENSITY OF CLOUDS AND PRECIPITATION IN THE FREE ATMOSPHERE), by O. Essenwanger and S. Schamach. Interim rept. on Contract R-65-0-99856-sc-01-91. [1961] 36p. 6 refs. AD-252 256.

DESCRIPTORS: *Clouds, Precipitation, Germany, Frequency, *Meteorological charts, Meteorological data, Height finding.

For Berlin, Tempelhof (Germany) 36 tables and 16 charts were established evaluating for each hour of the day the relationship between cloud base, cloud cover and altitude by season in the period 1949-1957. Isopleths of equal frequency of occurrence at or below a given altitude by hour of the day resemble a sine curve with 24-hr period and increasing amplitude with altitude. The isopleth crest associated with the minimum of cloud occurrence appears in the afternoon for stratiform and in the night for cumuliform clouds. The isopleth trough connected with the maximum cloud occurrence coincides with the morning hours for stratiform and with the early afternoon hours for cumuliform clouds. The (empirical) minimum probability of having more than 5 tenths clouds below 4500 ft. is 54, 22, 12 and 32% for winter, spring, summer, and fall, respectively; the maximum probabilities are 66, 52, 48, and 58%. Evaluation of cloud frequency in height layers is briefly discussed. Planned studies of cloud parameters by hours of the day and annual course are mentioned. (Author)

PB 155 942 $6.60

Weather Bureau, Asheville, N. C.
A CONTRIBUTION TO THE PROBLEM OF EVALUATING OCCURRENCE OF CLOUDS AND PRECIPITATION IN THE FREE ATMOSPHERE, by O. Essenwanger and S. Schamach. Final rept. on Contract R-65-0-99856-sc-01-91. Jan 61, 62p. 10 refs. AD-252 257.

DESCRIPTORS: *Guided missile trajectories, *Clouds, *Precipitation, Probability, Statistical analysis, Weather forecasting.

The problem was to investigate the probabilities of a missile encountering clouds and precipitation from the surface through 10 km. Tabulations and graphs are developed to show the occurrence rate of various cloud types and amounts below a given altitude as a function of time of day and season. A method of obtaining the

empirical probability of cloud occurrence in various height layers is developed as a function of time of day and season. The use of radiosonde observations to indirectly obtain cloud amounts present in the free atmos phere was considered. A detailed report is given, for a pilot station, on surface precipitation occurrence as related to time. Hourly aviation observations are found to be the most suitable source of data. Methods of presenting the data are developed to show statistical significance. The optimum presentation of a 23 year record is in terms of average occurrence over six hr periods, by day, by month. (Author)

PB 155 940 $3.60

Weather Bureau, Ashville, N. C.
FREQUENCY OF CLOUDS IN HEIGHT LAYERS (PRELIMINARY RESULTS). (A CONTRIBUTION TO OCCURRENCE AND INTENSITY OF CLOUDS AND PRECIPITATION IN THE FREE ATMOSPHERE), by O. Essenwanger and Gale Haggard. Part of Final rept. on Contract R-65-0-99856-sc-01-91. [1961] 36p. 4 refs. AD-252 258.

DESCRIPTORS: *Clouds, Precipitation, Atmosphere, Frequency, Intensity, Atmospheric sounding, Height finding.

The feasibility of establishing charts of frequency occurrence of clouds within given height layers was investigated from tabulations of cloud base frequencies. The general method is described and simplification is discussed deriving a K-factor similar to that suggested by Spreen and Solomon (Bull. AM. Meteorol. Soc. 39:261-265, 1958). Charts of cloud frequency within layers by the hour of the day in four seasons at Berlin (Tempelhof) are presented for 10/10 stratiform clouds. A belt of maximum cloud frequency is given between 600-1200 m in winter, which shifts to 1500-1800 m in summer. Diurnal variation of this belt is indicated in spring and fall. The core of the isolines decreases from 30-35% in winter to 7.5-10% in summer. (Author)

PB 155 941 $7.60

Weather Bureau, Asheville, N. C.
THE RELATION BETWEEN CLOUD COVER AND RELATIVE HUMIDITY (PRELIMINARY RESULTS), (A CONTRIBUTION TO OCCURRENCE AND INTENSITY OF CLOUDS AND PRECIPITATION IN THE FREE ATMOSPHERE), by O. Essenwanger and Gale Haggard. Part of Final rept. on Contract R-65-0-99856-sc-01-91. [1961] 78p. 8 refs. AD-252 259.

DESCRIPTORS: *Clouds, Precipitation, *Humidity, Atmosphere, Intensity, Tables, Frequency, Germany, Nebraska.

A method of statistically determining the cloud cover amount for any given height between surface and 10 km is developed from the analysis of aerological soundings in which temperature, humidity and pressure but no cloud data are available. Methods, problems, and shortcomings of the extraction of cloud cover-relative humidity data from RAOBS are discussed. Cloud cover and relative humidity appear to be related by an exponential function rather than by a straight line function. Tables are included showing the empirical data relating cloud cover to relative humidity at Berlin, Germany in January and July. Curves are presented comparing cloud cover frequency to relative humidity and average cloud cover to relative humidity. Classification of these functions is given by 1-km height intervals. The results indicate a dependence of the relative humidity-cloud cover relation upon the height. Results for temperature as a further stratification parameter for the cloud cover-relative humidity function are inconclusive but promising. (Author)

PB 155 939 $4.60

[Weather Bureau, Ashville, N. C.]
TABULATION AND SELECTED CHARTS FOR CLOUD LAYER DATA AT BERLIN (TEMPELHOF), GERMANY (ACCOMPANIED BY PERTINENT DESCRIPTIVE MATERIAL AS CONTAINED IN INTERIM REPORT "CLOUD FREQUENCY BY ALTITUDE AND HOUR OF THE DAY"). [1961] 49p.

DESCRIPTORS: (*Clouds, Meteorological charts, Tables, Meteorological data) (Germany).

See also PB 155 938

Geology

RME-4534(Rev.) $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C., and Instituto de Investigaciones Geologicas, Santiago, Chile.
RECONNAISSANCE FOR URANIUM IN THE TOCOPILLA AREA, PROVINCE OF ANTOFAGASTA, CHILE, by William A. Bowes, Paul H. Knowles and others. Feb 59, 20p.

RME-4527(Rev.) $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C., and Instituto de Investigaciones Geologicas, Santiago, Chile.
RECONNAISSANCE FOR URANIUM IN THE ELQUIVICUÑA AREA, PROVINCE OF COQUIMBO, CHILE, by William A. Bowes, Paul H. Knowles and others. Sep 58, 18p.

TEI-757 $2.60

Geological Survey, Washington, D. C.
GEOLOGIC RECONNAISSANCE OF THE TOPOPAH SPRING AND TIMBER MOUNTAIN QUADRANGLES, NYE COUNTY, NEVADA, by P. P. Orkild and J. S. Pomeroy. May 60, 20p.

Physics of the Atmosphere

PB 151 399-5 $1.50

National Bureau of Standards, Boulder, Colo.
MEAN ELECTRON DENSITY VARIATIONS OF THE QUIET IONOSPHERE NO. 5, JULY 1959, by J. W. Wright, L. R. Wescott, and D. J. Brown. Aug 61, 57p. 5 refs. Technical note no. 40-5.

DESCRIPTORS: *Ionosphere, Analysis, *Electrons, Density, Determination, Atmospheric sounding

The results of this program for one month are illustrated graphically. (See also PB 151 399-4).

PB 150 919 $1.60

Naval Research Lab., Washington, D. C.
ATMOSPHERIC SCATTERING IN THE VISIBLE AND INFRARED, by J. A. Curcio, G. L. Knestrick, and T. H. Cosden. 24 Jan 61, 17p. 10 refs. NRL rept. 5567; AD-250 945.

DESCRIPTORS: *Infrared radiation, *Aerosols, *Light transmission, *Atmosphere, Gases, Absorption, Distribution, Water vapor, Scattering.

The atmospheric aerosol particle-size distribution is examined using experimental spectral scattering coefficients in the wavelength interval 0.40 to 2.27 microns. The results show that the aerosol on a particular day can be represented by a two-component composite distribution. The main component is described by a Junge distribution and the other by a distribution similar to that of aerosols found in maritime air, or by a relatively monodisperse distribution contained in a narrow radius interval. This analysis shows that estimates of the aerosol particle size distribution may be in error if based only on attenuation measurements in the visible region. The contribution of the larger particles to the scattering coefficients is not apparent unless the infrared is also investigated. (Author)

ENGINEERING

PB 181 045 $.50

Bureau of Ships, Washington, D. C.
SHOP PRACTICE SUGGESTIONS [NO. 4] Nov 61, 34p.

DESCRIPTORS: (*Ships, Maintenance), *Machine shop practice.

Suggestions included are: portable fire-alarm test set; welding procedures; titrimetric standard for strong acids; plumbing tubing in refrigerant-12 systems; buffing boiler-tube ends; sound-powered telephone handsets; permanent-ground stations; rudder inspection plates; drydock hauling-in line; repairs to soot-blower heads; frustrum roller; renewing parts on switchboard instruments; CO_2 lifeboat valve heads; underwater-log system improved; valve-reseating machine; anchor chain gage; reclaiming diesel injection spray-valves; salt-water-system check valves; straightway valves; test coupon removal; wool grommets for watertight vents; automatic stanchion gland installation; vent systems test; removing catapult-trough covers; sonar leak-detector tests; epoxy repairs; economizer U-bends; underwater work platform; shaft-coupling bolt-remover; rudder boss plate and plug; pipe hangers; torpedo tube fittings; blind bushing puller; cutter for Styrofoam blocks; table for chasing threads; installation of stud pad and ring on CVA-type vessels; blading fixture for turbine rotor; gage marker for tensile specimens; watersealing lugs; coat locker design; oil slight window on gyrocompasses; venting foundry molds; lifting bulkhead assemblies; welder qualification register; honing large cylinder bores; pumps installed with parallel chocks; salt bath modifications; portable staging; chuck lifter for machine lathes; pipe hangers for steam systems; pipe staging spreaders; elevator life nets; resurfacing steam flanges; test data plate; offsets of conning tower fairwater; rack holder for radiac film badges; ATA bilge cleaning; temporary hydraulic power; steel plate drydock gratings; vermin-proofing sheetmetal doors; horizontal honing improved; main steam strainer; hydrochloric acid storage; rivnut installation reduced; reproducible sketches and patterns; charging needles for gas cylinders; suction and discharge valves modification; plan identification; removing expanded tubes from boilers; light bar; adjustable motor assembly platform; replacement of tailpiece for Cu-Ni alloy urinal; valve springs; preventing breakage of levelometer; plastic reflector shields; "Scotch" brand apron tapers; catapult track cover tool; marking of portable cover templates; Permit (SSN-594) launched; signal system for boiler cleaning; diffusing terminal. (See also PB 171 251)

NYO-9652 $3.60

Sedgwick Labs. of Sanitary Science, Inst. of Tech., Cambridge.
STUDIES ON DECAY-HEAT REMOVAL BY AIR CONVECTION FROM STORED CERAMIC MEDIA CONTAINING HIGH LEVEL FISSION PRODUCT WASTES, by B. C. Kim, N. E. Stefany and others. Rept. on Contract AT(30-1)-621. July 61, 40p.

Aeronautical Engineering

PB 158 680 $3.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INVESTIGATION AND EVALUATION OF UDOFTT MATHEMATICAL PROCEDURE, by H. J. Gray, Jr., M. B. Roberts and others. Progress rept. no. 1 on Summary of Moore School Reports on Mathematical Studies for Real-Time Simulation, Contract N61339-838. 4 June 60, 40p. 7 refs. Moore School rept. 60-23.

DESCRIPTORS: *Digital computers, Computers, Scheduling, *Flight simulators, Numerical analysis, Differential equations, Difference equations, Theory, Stability, Errors.

This report contains a summary of Moore School Reports on mathematical studies for real-time simulation by digital computers of airplane flight. The appendix contains a solution of a sample problem which is designed to illustrate the methods of Section II. Section III contains an outline for future plans of the program. (Author)

AD-258 062 $11.00

National Research Labs., Ottawa (Canada)
THE CONTROL SURFACE SUPPORTED BY MEANS OF A CONTINUOUS HINGE, by E. Kosko. Mar 61, 145p. 5 refs. Aeronautical rept. LR-303; N. R. C. no. 6326.

DESCRIPTORS: *Control surfaces, Structures, Beams, Differential equations, Elasticity, Deflection, Mathematical analysis, Load distribution, Theory, Moments, Integration, Shear stresses, Flaps, *Wings, Stresses Deformation, Cantilever beams, Joints, Airframes, Design, Transformations (Mathematics).

An elastic analysis is made of the loads transmitted between a movable control surface and a fixed supporting structure, both being idealized as beams connected by an elastic medium. The solution involves the integration of a system of ordinary differential equations similar to those in the theory of beams on elastic foundation. Explicit expressions and numerical results are given for structures of uniform properties, with estimates for the concentrated reactions at the ends of the hinge. The case of a deflected control surface is also covered. (Author)

PB 155 295 $1.60

National Research Labs., Ottawa (Canada)
INVESTIGATION OF LOW LEVEL TURBULENCE ENCOUNTERED BY A SABRE MK. V. AIRCRAFT OVER EASTERN CANADA, by D. M. McGregor. 16 Jan 61, 18p. 2 refs. Aeronautical rept. LR-298; N. R. C. no. 6194; AD-252 881.

DESCRIPTORS: *Jet planes, *Turbulence, Flight testing, Atmosphere, Canada, Gusts.

The turbulence encountered by a high speed aircraft flying at low level over the Laurentian Shield north of Ottawa, Ontario, during August, September and October, 1960, has been recorded by counting accelerometers. It was found that gust velocities of ±10 ft./sec. or greater occurred more frequently than was anticipated from the average of results of similar investigations carried out in other countries. Since the number of flights was small and the period during which they took place short, the results are considered to be of a preliminary nature only. More conclusive data are being sought by a continuation of these flights for a considerably longer period. (Author)

AD-256 845 $3.60

National Research Labs., Ottawa (Canada)
A MODEL-CONTROLLED AUTOPILOT FOR AN AIRBORNE VTOL SIMULATOR, by D. F. Daw, and L. V. Ursel. Feb 61, 37p. 15 refs. Aeronautical rept. LR-302.

DESCRIPTORS: *Vertical take-off planes, Design, Simulation, Automatic pilots, *Short take-off planes, Helicopters, Stability, *Flight simulators, Control systems, Control.

To establish valid handling qualities requirements for VTOL and STOL aircraft a need exists for a simulator which adequately simulates the dynamic response and environment of the vehicle under consideration. To this end a variable stability helicopter is proposed. This report outlines how a model-controlled autopilot may be used to vary the characteristics of a helicopter, enabling simulation of aircraft having a wide variety of dynamic response characteristics. (Author)

PB 153 652 $2.60

National Research Labs., Ottawa (Canada)
A PROPOSED AIRCRAFT LIFT/THRUST POWER PLANT ARRANGEMENT, by R. A. Tyler. 7 Dec 60, 29p. Aeronautical rept. LR-293; N. R. C. no. 6134; AD-253 428.

DESCRIPTORS: *Vertical take-off planes, *Turbofan engines, Turbojet engines, Turbojet exhaust nozzles, Gas turbines, Gas generator engines, *Power plants, Aircraft, Civil aviation, Safety, Hazards, Thrust, Lift, Design, Canada, Short take-off planes.

This report contains a brief description of an aircraft power plant arrangement of the turbofan type which has been the subject of some considerable analytical and design assessment during the past nine months and is believed to be of potential value in the civil STOL/VTOL aircraft application. (Author)

PB 155 417 $2.60

National Research Labs., Ottawa (Canada)
THERMAL STRESSES IN MULTI-LAYER SPHERICAL SHELLS, by G. R. Cowper. Feb 61, 21p. 4 refs. Aeronautical rept. LR-300; N. R. C. no. 6201; AD-253 690.

DESCRIPTORS: *Structural shells, Spheres, *Thermal stresses, Laminates, Thermal insulation, Temperature, Aluminum, Mathematical analysis, Airframes, Airplane panels, *Aerodynamic heating Heat transfer, Stresses.

This report considers a thin spherical shell, the skin of which is made up of a number of uniform layers of different materials bonded together, and the stresses which occur therein as a result of a steady temperature gradient across the skin and internal pressure. After the method of stress calculation is outlined, numerical results are presented for aluminum shells covered by layers of various insulating materials. The results give an estimate of the magnitude of thermal stress which may occur in the skin of an insulated aircraft structure. (Author)

AD-257 001 $1.10

National Research Labs., Ottawa (Canada)
VERTICAL ACCELERATIONS ENCOUNTERED BY AIRCRAFT ON AGRICULTURAL OPERATIONS, by R. T. Sewell. Apr 61, 8p. Aeronautical rept. LR-304.

DESCRIPTORS: *Acceleration, *Aircraft, Instrumentation, Measurement.

Three Boeing A-75N-1 aircraft (Stearman), operated by Wheeler Airlines, were fitted with NRC Registering G-Meters in order to obtain data on vertical accelerations encountered during agricultural operations. Records were obtained from two aircraft only, covering a period of 60 flying hours, the aircraft being

engaged in forest-spraying operations in New Brunswick. Maximum acceleration increments recorded did not exceed 1.9g negative and 2.5g positive. (Author)

PB 155 757 $2.60

Naval Research Lab., Washington, D. C.
THE PRECIPITATION-STATIC PROBLEM, by Wayne C. Hall. Partial rept. no. 5, 24 Apr 44, declassified 15 Dec 53. 23p. Rept. no. 0-2280.

DESCRIPTORS: *Aircraft, *Precipitation static, Reduction, Meteorology.

Using a newly developed apparatus and method, the rates of free electrical charge production on a number of different surfaces moving through a snow storm at high speeds were measured under various controlled conditions. The variables whose effects were sought were speed, temperature, composition of coating, and rate of snowfall. It was found that the charging rate of a surface varied about as the cube of the speed, that the sign of the charge produced on certain surfaces depended on the temperature, and that painted surfaces could be made which charged at approximately 40 percent of the rate of standard Navy non-camouflage airplane finishes. The charging rates of the leading surfaces of a moving body were found to be several times higher than those of the sides or trailing surfaces. The results so obtained are discussed briefly. They add appreciably to the present knowledge of the problem of precipitation-static on aircraft. All measurements reported were made during actual snowstorms by means of specially developed apparatus located out-of-doors where it was exposed to natural weather conditions closely simulating those of actual aircraft flying through snow. Particular effort was made to operate with only fresh, previously untouched snow. The apparatus is described in the appendix. (Author)

PB 158 501 $10.10

Research, Inc. [Hopkins, Minn.]
DESIGN STUDY OF AN ARRESTING CABLE THROWING DEVICE FOR ENGAGING JET AIRCRAFT, by V. H. Larson, J. A. Zdrazil, and R. D. Holmberg. Rept. on Contract AF 33(600)37942. Feb 60, 128p. WADC Technical note 59-125; AD-235 912.

DESCRIPTORS: *Jet planes, Airplane landings, Arresting gear, Design, Mathematical analysis, *Safety devices, Take-off, Tests.

This report presents the results of the design study phase of a program for the development of an aircraft arresting cable ejection system. The study was aimed toward the determination and initial development of the most feasible means of throwing a cable from below the runway surface for the engagement (and subsequent arrestment) of jet aircraft. Two modes of operation were of interest in this study: emergency engagement of the main struts, and operational engagement of a hook located aft of the main wheels. Among the systems analyzed, concept tested and evaluated were air ejection, explosive, electro-magnetic, torsion bar, and cable tension ("bow string") units. The air ejection system was deemed the most feasible for universal application. It is described in detail with a preliminary design established. A velocity computing timing system developed, fabricated and tested during the program is described. An alternate explosive cord system utilizing a simplified firing system is proposed for emergency applications. (Author)

PB 158 500 $3.60

Research, Inc. [Hopkins, Minn.]
ENGAGEMENT PROBLEMS ASSOCIATED WITH THE ARRESTMENT OF USAF JET AIRCRAFT, by J. A. Zdrazil. Rept. on Contract AF 33(600)37942. Feb 60, 40p. WADC Technical note 58-365; AD-235 423.

DESCRIPTORS: *Jet planes, Airplane landings, Arresting gear, Design, Analysis, *Safety devices, *Jet fighters, *Jet bombers, *Jet training planes, *Transport planes, Take-off.

Several USAF jet aircraft were studied for the purpose of evaluating problems connected with stopping them by the use of a steel cable. Two modes of operation were considered, operational use and emergency use. Area and time of operation envelopes were determined for each mode. Problems concerning aircraft both individually and as a group were reviewed. It was concluded that proper system design would enable a majority of aircraft configurations to be arrested. (Author)

Chemical Engineering

PB 181 041 $3.00

General Electric Co., Burlington, Vt.
EVALUATION OF A THIN-FILM SEA WATER DISTILLATION UNIT FOR MARINE AND SHORE BASE APPLICATION. Rept. on Contract NObs-78202. Oct 61, 156p. Saline Water Research and Development progress rept. no. 54.

DESCRIPTORS: (*Sea water, Desalination) (*Evaporators, Thin films, Design, Specifications, Tests) (*Scale, Deposits, Chemical analysis)

A General Electric Thin Film Sea Water Distillation Unit designed for marine application has been evaluated. The results demonstrate the feasibility of the thin film process for this application. The technology made available by this work provides criteria for the design of compact equipment. All requirements of the contract were achieved and have been reported in the contractor's monthly reports.

HW-66320 $1.25

Hanford Atomic Products Operation, Richland, Wash.
DISSOLUTION OF POWER REACTOR FUEL CORES, by H. T. Blaine. Rept. on Contract AT(45-1)-1350. Aug 60, 47p.

HW-67674 $1.10

Hanford Atomic Products Operation, Richland, Wash.
FLOWSHEET FOR SEPARATION OF PLUTONIUM FROM THORIUM AND URANIUM, by L. E. Burns. Dec 60, 7p.

CF-61-8-68 $1.60

Oak Ridge National Lab., Tenn.
EUROCHEMIC ASSISTANCE PROGRAM, by R. J. Sloat and E. M. Shank. Progress rept. July 60-June 61. Aug 61, 16p.

ORNL-TM-5 $1.10

Oak Ridge National Lab., Tenn.
LOW LEVEL WASTE TREATMENT BY ION-EXCHANGE, II. USE OF A WEAK ACID, CARBOXYLIC-PHENOLIC ION-EXCHANGE RESIN, by R. R. Holcomb and J. T. Roberts. Sep 61, 9p.

Civil Engineering

PB 181 063 $2.50

Bureau of Yards and Docks, Washington, D. C.
WHARFBUILDING FORMULAS. Engineered Performance Standards, Public Works Maintenance. Feb 61, 101p. NAVDOCKS P-715.1.

DESCRIPTORS: *Piers, Construction, Standards, Marine engineering, Harbors, Floating docks, Naval shore establishments, Tools, *Maintenance equipment, Maintenance tools, *Machine tools, Military requirements, Engineering.

Contents:
Pile driver operations
Floating crane operations
Dismantle and assemble structural timbers - fender systems
Use of wharfbuilding tools and equipment
Camel logs
Protective caps for timber piles
Water travel
Skidrigged pile driver moves on job site

HW-62223(Rev.) $2.60

Hanford Atomic Products Operation, Richland, Wash.
REACTOR BUILDING STRUCTURAL STRENGTHS REINFORCEMENT TECHNIQUES, AND SEALANT MATERIALS: A CG-791 CONTAINMENT TEST, by H. F. Jensen. Final rept. on Contract AT(45-1)-1350. Dec 59, 30p.

AD-259 138 repriced $2.25

Naval Civil Engineering Lab., Port Hueneme, Calif.
BLAST LOAD TESTS ON POST-TENSIONED CONCRETE BEAMS, by H. T. Miyamoto and J. R. Allgood. 29 May 61, 90p. 13 refs. Technical rept. R-116; DASA-1198.

DESCRIPTORS: (*Beams, *Concrete, Design, Blast, Tests, Test methods, Test equipment) (*Reinforced concrete, Physical properties), Reinforcing materials.

Four types of post-tensioned prestressed concrete beams with straight unbonded bars were tested under static and blast loading to study their behavior. The tests showed that the response of prestressed beams can be predicted by a one-degree of freedom system provided the correct damping and resistance functions are known. (Author)

Electrical and Electronic Engineering

PB 155 276 $2.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
BIBLIOGRAPHY ON UNCONVENTIONAL SOURCES OF ELECTRICAL POWER, by John B. Forlini. Nov 59, 26p. 105 refs. LTIS Bibliography no. 1; AD-231 326.

DESCRIPTORS: *Electric power production, Power supplies, Fuel cells, *Thermoelectricity, Solar energy, Bibliography.

PB 155 271 $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
AZIMUTHAL PATTERN OF SLOTTED ARRAY ANTENNAS ON A CONE, by Marie D. Prytulak. 20 Feb 61, 38p. 4 refs. Technical rept. TR-913; AD-253 785.

DESCRIPTORS: Antennas, *Antenna radiation patterns, Theory, Azimuth, *Slot antennas, *Conical antennas, Angle of arrival, Intensity, Mathematical analysis, Measurement.

A theoretical approach for determining the azimuthal patterns for slotted array antennas on a cone is presented. Both one-way and two-way patterns are formulated for four equispaced antennas on a cone; a Tchebyscheff distribution is assumed in designing the antennas. Azimuthal patterns are calculated for antennas placed on cones having half-cone angles of 5, 10, and 15 degrees. These relative patterns are in agreement with experimental patterns, i.e., as the half-cone angle increases, the pattern takes on the appearance more and more of a clover leaf, since the nulls become deeper and wider at the angular positions where the antennas are located. (Author)

PB 155 270 $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
CERAMIC COVERED ANTENNAS, by Whilden G. Heinard. 15 Feb 61, 17p. 3 refs. Technical rept. TR-903; AD-252 183.

DESCRIPTORS: *Guided missile antennas, *Slot antennas, Antennas, Airborne, Ceramic materials, Dielectrics, Design, Protective coverings, Microwave equipment, Electrical properties, Mechanical properties, Materials.

A brief description of the construction of several microwave antennas with high dielectric-constant covers is given along with patterns of some experimental models. Certain electrical and mechanical problems are presented with their solutions. (Author)

PB 154 858 $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
DETERMINATION OF INFORMATION BANDWIDTH REQUIREMENTS FOR A TM SYSTEM, by G. R. Hickcox, R. N. Johnson, and R. A. Parkhurst. 25 Jan 61, 15p. 3 refs. Technical rept. TR-871; AD-251 637.

DESCRIPTORS: Telemeter systems, Distortion, *Waveform generators, *Band pass filters, *Low pass filters, *Signal generators, Mathematical analysis, Simulation, Radio waves.

Determination of the bandwidth required for a telemeter system is based on the knowledge that the primary bandwidth-determining signal is a gaussian pulse. Observation of the distortion generated by passing the signal through a variable-bandwidth, sharp-cutoff, linear-phase, low-pass filter would result in a quick determination of the required bandwidth. Such filters are neither available nor very feasible. Keeping the waveform rigidly periodic, however, results in discrete spectrum lines (poles on the j axis). These may be removed by placing zeroes at the discrete frequencies. A filter simulator places zeros extremely close to the spectrum-line frequencies and provides amplitude equalization with suitably placed poles. Thus, the bandwidth is easily determined by successively blanking out frequency lines--starting with the highest and continuing until the distortion of the output surpasses the acceptable maximum. Such a filter simulator may be used to determine the bandwidth of any waveform that can be made exactly periodic. (Author)

PB 154 860 $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
INVESTIGATION OF SEMICONDUCTOR DEVICES FOR SQUIB-FIRING APPLICATIONS, by Erwin Hirschmann. 19 Jan 61, 15p. 2 refs. Technical rept. TR-889; AD-251 173.

DESCRIPTORS: *Semiconductors, *Transistors, Silicon, *Rectifiers, *Firing circuits, *Electric detonators, Test equipment, Tests, Design, Electrical properties.

Some transistors and silicon-controlled rectifiers (SCR's) were investigated for squib-firing applications at high-pulse currents in excess of normal ratings. The transistors were unsatisfactory, primarily because the energy transmitted into the squib was too small. The SCR devices produce the required energy in the squib if they are chosen for the proper breakover voltage and forward resistance. (Author)

PB 155 268 $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
MATHEMATICAL ASPECTS OF A PREDICTION FILTER FOR PULSED CUBIC SIGNALS IN NOISE, by Walter J. Brinks. 10 Feb 61, 25p. 4 refs. Technical rept. TR-899; AD-251 989.

DESCRIPTORS: *Radar equipment, Design, Video filters, Noise (Radar), Mathematical analysis, Radar tracking, Memory devices, *Radiofrequency filters.

The mathematical elements required in the design of a type of optimizing filter were derived. This filter is a finite memory, optimum prediction filter in the least-squared error sense, which deals with a pulsed cubic signal in postdetection noise that had been white and Gaussian at the intermediate frequency. (Author)

PB 154 859 $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
AN OMNIDIRECTIONAL TM ANTENNA, by J. A. Kaiser and A. J. Kendall. 10 Jan 61, 38p. Technical rept. TR-901; AD-250 771.

DESCRIPTORS: *Antennas, *Loop antennas, *Antenna radiation patterns, Impedance, *Telemetering antennas, *Rocket antennas, Cylindrical bodies, Design.

A dual-band, low-protrusion telemetering antenna system has been designed which provides symmetrical and almost ideal omnidirectional radiation coverage, each antenna element consists of two rectangular loops, one 20 in. long over-all, and the other 27 in. long. Maximum height is 3-1/2 in. The bandwidth at 236 mc is 8 mc and 5 mc, respectively, for VSWR less than 2:1. (Author)

PB 157 369 $2.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
FEASIBILITY OF ELECTRIC ACTUATORS FOR TORPEDO CONTROL SURFACES, by Robert W. Rasche. Rept. on Contract Nonr-1841(53). Sep 60, 20p. 8 refs. Rept. 8060-R-5; AD-253 285.

DESCRIPTORS: Torpedoes, *Homing torpedoes, *Control surfaces, Hydraulic actuators, *Electric motors, *Electric servomechanisms, Direct current, Gears, Torque, Design, Specifications, Analysis, Rectifiers, Silicon.

A summary is given of a feasibility investigation of electric control surface actuators for high-speed homing torpedoes. Specifications consistent with high-speed torpedo (RETORC) performance requirements are assumed. Conventional motors are shown to be unable to compete with hydraulic actuator systems on a weight and size basis even if performance requirements are greatly relaxed. However, preliminary investigation of a special d-c motor used in conjunction with control circuitry utilizing silicon controlled rectifiers indicates that electric actuator systems are feasible and offer potential improvement over existing high-performance hydraulic systems. (Author)

MND-P-3015-II $7.60

Martin Co., Baltimore, Md.
SNAP PROGRAMS: THERMIONIC ISOTOPIC POWER SYSTEMS. Quarterly progress rept. no. 7, 1 Apr-30 June 61, on Contract AT(30-3)-217. 73p.

PB 158 499 $3.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INVESTIGATION OF THE MEASUREMENT OF RADIO INTERFERENCE, by Fred Haber and Nabil Farhat. Progress rept. no. 56, 1 Jan-31 Mar 60, on Contract NObsr-72505. 15 Apr 60, 34p. 3 refs. Moore School rept. no. 60-21; AD-244 929.

DESCRIPTORS: *Radio interference, Measurement, Sources, Radio fields, Intensity, Meters, *Electrical corona, *Test sets, Noise (Radio), *Radio communication systems, Mathematical analysis.

Corona Noise Studies: The pulse modulator developed to simulate corona noise was rebuilt to accommodate larger duty cycles and lower repetition rates than the device previously constructed. The device constructed will operate at duty cycles as high as 50% and at repetition rates at least as low as 60pps. A method for computing the quasi-peak to average and quasi-peak to rms ratios for pulse modulated gaussian noise has been worked out. These ratios have been computed for a square modulating envelope for which the higher level is twice the amplitude of the lower level. Except for the numerical calculation of several other definite cases this concludes all the calculation planned heretofore, using the idealized model. RIFI Meter Circuit Analysis: A report on the study made of the factors involved in the design of constant bandwidth RIFI meters, and a description of a proposed method to accomplish this is given. Approximate methods for calculating the response of a diode detector to a burst of it pulses with an envelope of the kind generally obtained in an if amplifier (an envelope of the shape of the gaussian error curve has been assumed) have been investigated. (Author)

PB 153 384 $1.10

Naval Research Lab., Washington, D. C.
AN IMPROVED "TWIST-TURN" WAVEGUIDE JUNCTION, by R. S. Potter. 18 Jan 61, 9p. 5 refs. NRL rept. 5588: AD-251 582.

DESCRIPTORS: *Waveguide joints, *Waveguides, *Waveguide bends, *Waveguide irises, Design, X-band, Broadband.

A modified twist-turn waveguide junction was developed which exhibits a VSWR of less than 1.06 for the frequency range 8.5 to 9.5 kmc. This performance was obtained by incorporating an asymmetric broadbanding iris on the broad wall opposite the coupling pin in the junction. Although this iris is capacitive, the power handling capability of the junction was not affected since it is more seriously limited by the gap between the coupling pin and the opposite rectangular waveguide broad wall. The tolerances of the design dimensions are critical. Precision soldering techniques were found to produce adequate control of design dimension, provided a final adjustment of the pin is possible. (Author)

SCTM-203-60(14) $1.00

Sandia Corp., Albuquerque, N. Mex.
A HIGH-VOLTAGE PULSE GENERATOR FOR TESTING DIELECTRIC SAMPLES, by R. D. Kelly. Aug 61, 39p.

SCTM-181-61(14) $0.50

Sandia Corp., Albuquerque, N. Mex.
A PULSE AMMETER, by J. J. Newman. Oct 61, 14p.

SCTM-136-61(14) $0.50

Sandia Corp., Albuquerque, N. Mex.
ULTRASONIC CLEANING OF TRANSISTORS, by J. A. Hood. June 61, 19p.

PB 147 911 $3.60

Stanford Electronics Labs., Stanford U., Calif.
A BIBLIOGRAPHY ON SOLID-STATE MASERS, by A. E. Siegman. Rept. on Contract AF 33(616)6207. 29 Apr 60, 31p. 241 refs. Technical rept. no. 156-6.

DESCRIPTORS: *Microwave amplifiers, Microwave oscillators, Bibliography.

This is an extensive bibliography covering the solid-state maser and closely related topics. While no claim is made that the listings are exhaustive, the bibliography does include every solid-state maser article which has come to the author's attention in scanning the various abstract services and the major technical journals. It includes articles appearing until approximately April 1, 1960.

PB 150 380 $1.60

Stanford Electronics Labs., Stanford U., Calif.
DATA ON CAPACITIVE LOADING OF HELICAL WAVEGUIDES, by R. P. Lagerstrom and D. C. M. Lin. Rept. on Contract AF 33(616)6207. 29 July 60, 13p. 6 refs. Technical rept. no. 490-2; AD-241 988.

DESCRIPTORS: *Waveguides, Amplifiers, Circuits, Design, Traveling wave tubes, Impedance, Measurement.

Variation of phase velocity with frequency was reduced considerably in helical-groove waveguides by adding capacitive loading at the groove openings. Data are given on 5 experimental models with lips of varying spacing and thickness placed across the helical groove where it joins the center hole. The loading decreases the cutoff frequency, increases the asymptotic velocity, and decreases the interaction impedance. An impedance of 5 ohms on the axis for a circuit velocity of 0.5c was measured for the most promising model tested. (Author)

PB 147 169 $6.60

Stanford Electronics Labs., Stanford U., Calif.
DESIGN OF SYSTEMS TO TOLERATE VARIABLE PARAMETERS, by P. E. Merritt. [Subcontract to] Texas Instruments, Inc. 26 Feb 60, 67p. 6 refs. Technical rept. no. 1503-2; AD-236 274.

DESCRIPTORS: (*Electronic equipment, *Transistors, *Semiconductors, *Intermediate frequency amplifiers, Design, Specifications, Production), (Statistical analysis, Statistical processes, Reliability, Quality control, Topology).

The design procedures discussed extend present circuit and system design procedures by presenting a quantitative method of accounting for parameter variations from system to system. The principal contributions of this study are: (1) the presentation of a design procedure which combines the additional consideration of parameter variations with conventional design concepts to give a composite which deals more completely with actual problems; (2) the establishment of a topological representation of the effect of parameter variations allowing the electrical circuit design and statistical problem to be studied simultaneously through a single medium, the signal-flow graph, and (3) the introduction of a design criterion which inter-relates the time and ensemble averages of a system error function, providing a basis for obtaining maximum performance from all systems within a production population. (Author)

PB 157 552 $3.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH. Consolidated quarterly status rept. no. 8 for 1 July-30 Sep 60 on Contracts Nonr-225(31, 44, 24), DA 36-039-sc (85339, 73178, 78296) and AF 33(616)6207. [1960] 38p. 10 refs. AD-246 008.

DESCRIPTORS: Electronics, *Scientific research, *Electronic equipment, Electron tubes, Semiconductors, *Transistors, Circuits, Solids.

Contents: Neuristor study; Models of thermoelectric devices; Improvement of reliability by redundancy and adaption; Adaptive switching circuits; Switching type regulators; Multi-stage tuned-amplifier design; Logarithmic video attenuators; Miscellaneous short-term activities; AGC circuits for large signals; Variable delay lines for phase modulation; A study of nonlinear distortion of transistors; A study of field effect switching devices; Studies of breakdown in silicon; Triggering in avalanche transistors; Study of hot electrons in silicon; Silicon oxide capacitors; Phosphorous diffusion; Oxide film studies; Neuristor device study; Experimental noise studies; Thin-film silicon-carbide devices; Solid-state microwave amplifying and generating devices; Large-signal analysis of nonlinear transmission lines; High-level injection studies; Wideband transistor amplifiers; High-speed high-current switching devices; Broadband maser amplifiers; Theoretical studies of solid-state masers; Parametric amplifiers; Ferrimagnetic filters and resonators.

Ordnance, Missiles, and Satellite Vehicles

UCID-4344 $1.60

THEORY OF UNDERGROUND EXPLOSIONS - CEPH MODEL - STEADY STATE. Apr 60, 15p.

AD-256 538 $3.60

Aerospace Corp., Los Angeles, Calif.
AN EXPLICIT METHOD OF GUIDING A VEHICLE FROM AN ARBITRARY INITIAL POSITION AND VELOCITY TO A PRESCRIBED ORBIT, by D. MacPherson. 13 Feb 60, 34p. TDR-594(1565-01)TN-1.

DESCRIPTORS: Guidance, Control, Simulation, Mathematical analysis, *Rocket trajectories, *Satellite vehicle trajectories, Orbital flight paths, Exterior ballistics, *Re-entry vehicles, *Satellite vehicles, Aerodynamics, Supersonics, Guided missiles, Surface-to-surface, Manned.

A derivation is presented of an explicit technique for guiding a constant thrust, constant effective exhaust velocity rocket from any initial position and velocity to any preselected orbit (or equivalently, any burnout position and velocity) compatible with vehicle performance capability. This presentation has been made in as general a manner as possible with emphasis placed on the principles involved rather than on the sophistications and details of mechanization. It is assumed that the only continuous control available is the orientation of the vehicle thrust attitude in two mutually perpendicular planes. An additional discrete form of control is available in that the vehicle thrust can be terminated at any time. It is the function of the guidance equations to generate commands such that these controls will be effectively utilized in attaining the desired vehicle performance. In the equations presented, these control commands are generated analytically on the basis of sound physical approximations; and thus not only do the equations have a rather general applicability but also extreme precision. This guidance technique is the basis for the guidance equations which will be used to guide the Mercury Atlas flights.

AD-256 846 $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. A SECOND STUDY. PART 2: EFFECTS OF LONG TERM CONFINEMENT ON PERFORMANCE, by Neal M. Burns and Edmund C. Gifford. 13 Mar 61, 30p. 31 refs. Rept. no. NAMC-ACEL-414.

DESCRIPTORS: Spaceship cabins, Effectiveness, Confinement, *Space environmental conditions, *Space medicine, *Psychology, Tracking, Behavior, Reasoning.

The feasibility of six men living and performing routine tasks in a simulated space vehicle supplied by a closed-loop, solid chemical, rebreathing system for a period of eight days has been demonstrated. The problem areas chosen for this investigation proved to be sensitive to the experimental situation. The many other behavioral variables affected by confinement and the other stresses that were operating simultaneously with confinement remain to be investigated in future studies

PB 157 697 $11.00

Armour Research Foundation, Chicago, Ill.
BLAST EFFECTS ON TANK STRUCTURES, by G. Nagumo and A. Wiedermann. Final test rept. no. 7 on Blast Effects on Buildings and Structures Operation of Six-Foot and Two-Foot Shock Tubes, Contract AF 29(601)796. [1960] 142p. ARF Proj. no. D144; DASA 1154; AD-233 095.

DESCRIPTORS: *Storage tanks, Configuration, Model tests, Shock tubes *Blast, Shock waves, Load distribution, Rotating drum cameras, *Pressure, *Test facilities.

A test program on cylindrical tank type structures was conducted in the Air Force Shock Tube Laboratory, Gary, Indiana, in order to obtain pressure-time loading data. Several cylindrical tank models were tested at peak overpressure of 20 psi and a positive duration of 35 msec. Model parameters tested included cone roof models, floating flat roof models (0.1, 0.5, and 0.9 full), models with and without windgirders and with three different height-to-diameter ratios. Loading schemes were obtained for the various exposed surfaces of the above models and some comparisons were made between the different model configuration parameters. (Author)

PB 158 502 $6.60

Army Ballistic Missile Agency, Huntsville, Ala.
A PRECISE ATTITUDE CONTROL FOR ARTIFICIAL SATELLITES, by Hermann Oberth. 2 Apr 57, 69p.

DESCRIPTORS: (*Satellite vehicles, Control systems, Flight attitude indicators).

An attitude control for artificial satellites is described which utilizes the so-called "Tidal Forces" which are exerted upon the satellite. The great advantage in using this method of control is its precision in that an accuracy of 0.0001 radian (21 secs.) can be realized without difficulty. A disadvantage of this method is that it cannot be used alone. It must be complemented with some other means of control to bring the satellite to a desired attitude from which it can be further controlled by the method described herein. First, the tidal forces are defined, described and calculated. Then follow several technical proposals concerning the use of these forces for an attitude control. (Author)

PB 156 981 $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
EVALUATION OF A PLASTIC-BONDED HC SMOKE COMPOSITION FOR THE M8 GRENADE, by John E. Andrews, Jr., Kenneth G. Carlon, and Woodrow W. Reaves. Apr 61, 28p. CRDLR 3065; AD-254 565.

DESCRIPTORS: Grenades, *Smoke grenades, Smoke munitions, *Binders, Plastics, Resins, Polymers, Esters, Preparation, Storage, Stability, Packaging, Smoke screens, Ethanes, Zinc compounds, Oxides, Aluminum, Combustion, Smokes, Production.

This report covers a study conducted to determine the feasibility of incorporating a plastic binder into the HC smoke composition to improve the storage stability and the loading characteristics of the M8 white-smoke grenade. Polyvinyl acetate and Laminac 4116 were the plastics investigated. Laminac 4116 shows definite promise. (Author)

AD-255 595 $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A DISPLACEMENT-SENSING CONSTANT-TORQUE RESPONSE LEVER DESIGNED FOR USE IN SATELLITES, by Robert M. Herrick and Paul Karnow. Rept. no. 4 on Proj. MR005.15-0002.16. 3 Apr 61, 24p. 2 refs. NADC-MA-6105.

DESCRIPTORS: (Satellites, Instrumentation, *Satellite vehicle research, Design) (*Torque, *Acceleration, Instrumentation, Calibration, Test equipment)

This report describes an animal response lever mechanism which (a) senses the displacement of the lever resulting from each press, (b) requires a constant torque throughout the total excursion of the lever arm, and (c) maintains the same torque characteristics under G. Calibration devices and techniques developed to evaluate the lever mechanism indicate its usefulness as a tool for the study of the effects of accelerations-including zero G -on behavior. Sample data on (a) lever-pressing rate, (b) frequency-displacement distributions, (c) characteristics of individual responses, and (d) the order of occurrence of different responses indicate the variety of data obtainable and the depth of analysis possible with the response mechanism. (Author)

PB 155 269 $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
FUZE, PDSQ, 20 MM, XM537, by Peter B. Ferrara. Summary rept. 31 Jan 61, 23p. Technical rept. TR-890; AD-252 330.

DESCRIPTORS: *Point detonating fuzes, Windshields, *Projectile fuzes, Fuzes, Impact fuzes, Fin stabilized ammunition, Projectiles, Design, Tests, Projectile windshields, *Spotting rounds, Spotting rifles, Guns.

A point-detonating 20-mm fuze, designated XM537, has been developed for use with the 20-mm XM101 cartridge, which is a fin-stabilized low-velocity (approx 520 fps) spotting round for the XM28 weapon system. The basic design was patterned after a DOFL double-element setback mechanism, which was modified to incorporate a firing pin and stronger setback springs to provide a larger arming range. This mechanism, used with a moveable detonator housing, provides out-of-line safety and time integration to arm the fuze. An impact function score higher than 95 percent was obtained on all types of terrain within the required impact angles. Impact tests conducted on sod, mud, soft earth, water, and hard surfaces indicate functioning time within 2 msec and arming distances from 3.5 to 7 ft between zero and 15 degrees. (Author)

PB 154 857 $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
SEQUENTIAL RELIABILITY ASSURANCE PLAN FOR BOMARC FUZE, by J. J. Serado. 5 Jan 61, 24p. 6 refs. Technical rept. TR-817; AD-251 174.

DESCRIPTORS: Reliability, *Guided missile fuzes, *Statistical tests, Failure (Mechanics), Probability, *Sequential analysis, Fuzes.

Sequential methods are presented for evaluating for acceptance purposes the ability of the T3019 Bomarc fuze to meet a reliability test that simulates its expected operational environment. Assuming an exponential distribution for time between fuze failures, the decision criteria for establishing conformance with the reliability test requirements are developed. Estimates of expected number of failures per test, expected test time per unit, and probability of acceptance, are given as a function of mean time between failures of submitted units. (Author)

PB 157 370 $1.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
TORPEDO INSTRUMENTATION AND CONTROL, by Robert W. Rasche. Final rept. on Contract Nonr-1841(53). Sep 60, 11p. 6 refs. Rept. 8060-R-6; AD-250 891.

DESCRIPTORS: *Acoustic torpedoes, *Homing torpedoes, *Torpedoes, Torpedo trajectories, Echo ranging, Tracking, Optical tracking, Instrumentation, Control systems, Automatic pilots, Electric motors, Depth indicators, Servo motors, Pressure, Measurement, Control surfaces, Antisubmarine ammunition.

The research program reported had as objectives the evaluation of the effects of line-of-sight disturbances on the performance of acoustic homing torpedoes and a general advancement of the state of the art in information and control theory as applied to acoustic homing torpedoes. Three general areas of investigation were considered. These are torpedo instrumentation for reconstructing torpedo trajectories, electric actuators, and pressure sensors. A listing is given of the previously published technical reports which completely present the results of this research. The subject matter of the individual reports is discussed briefly and abstracts of each report are presented. (Author)

PB 155 789 $4.60

Lockheed Aircraft Corp., Palo Alto, Calif.
A PROPOSED GROUND AND FLIGHT PROGRAM TO DEVELOP SPACE AGE MATERIALS, by Morris Steinberg, J. Fox, and Bruno Augenstein. [1960] 47p. 25 refs. LMSD-288244; AD-254 438.

DESCRIPTORS: *Materials, *Space environmental conditions, *Satellite vehicle research, Satellite vehicles, Design, Organic materials, Solar spectrum, Ultraviolet radiation, Van Allen radiation belt, Radiation damage, Erosion, Meteorites, Electromagnetic effects, Flight testing, Cosmic rays, Tests, Infrared radiation, Thermal radiation, Physical properties, Metals, Simulation, Space flight

Reprint of a paper presented at the Structural Design of Space Vehicles Conference held at Santa Barbara, Calif., 6-8 Apr 60.

PB 181 064 $0.50

Naval Ordnance Lab., White Oak, Md.
THE ROTATION VECTOR IN COMPUTING TRAJECTORIES, by Andre Gleyzal. 27 June 61, 7p. 2 refs. Mathematics Dept. rept. M-20; NOLTR 61-48.

DESCRIPTORS: *Bodies of revolution, Velocity, *Flight paths, *Tensor analysis, Rotation.

A set of variables and equations relating angular velocity and orientation of a rigid body is considered. In this formulation three independent variables define an orientation and these variables and their time derivatives are related to the transformation tensor and to angular velocities by means of functions which are rational functions free of singularities except for a square root function. Thus these variables and equations may be convenient for the computation of trajectories. The formulation is closely related to the formulation based on the unimodular quaternion. Here there is used four variables subject to the unimodular constraint instead of three independent variables as in this report. (Author)

AD-255 129 $2.60

New York U. Coll. of Engineering, N. Y.
ANALYSIS OF WIND STRUCTURE. PHASE 3. MATHEMATICAL ANALYSIS OF TURBULENT STRUCTURE, by Leo J. Tick and Isidor Pomper. Final rept. on Contract DA 36-039-sc-78091. Dec 60, 30p. 5 refs.

DESCRIPTORS: *Atmosphere, (*Atmosphere models, *Wind, Turbulence, Analysis, Measurement, Mathematical analysis), (*Rocket trajectories, Meteorology)

A model of turbulence near the ground is developed whose spectral (hence covariance) structure depends on single scalar function. This model is derived from an isotropic system by statistical conditioning and has the characteristic that the spectral structure becomes more isotropic as one goes further from the ground. A form of impulse response function for a fin-stabilized rocket is given and an expression for the dispersion of the rocket about the windless path as a function of elevation and azimuth is presented. (Author)

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB 158 288 $1.60

Utah State [U. of Agricultural and Applied Science] Logan.
EXPLORATION OF CHEMICAL TECHNIQUE FOR DETECTING FLAVOR CHANGES DURING PROCESSING OF MEAT, by D. A. Greenwood. Rept. no. 7 (Final) 5 Apr 55-30 June 56, on Contract DA 19-129-QM-330. [1956] 18p. 19 refs. File no. A-320; AD-117 847.

DESCRIPTORS: *Meat, Processing, Taste, Determination, Food, Detection.

The results obtained in these exploratory studies may be summarized as follows: (1) as observed by others,

cooked meat flavors are complex and appear to consist more of odors than of tastes; (2) there are wide variations in the eating habits of people which will influence likes or dislikes for foods; (3) some of the flavor components of cooked meat may be separated from the meat by distillation (steam) and extraction with certain solvents, e.g., methanol; (4) steam distillates of fresh and heat processed beef, lamb, pork, and other canned products contained volatile nitrogen (ammonia) and sulfur (hydrogen sulfide) compounds as well as other compounds; (5) elevated concentrations of volatile nitrogen (ammonia) and sulfur compounds (as hydrogen sulfide) were found in steam distillates of some canned meat products with undesirable processed or canned flavor; (6) canned products containing meat, vegetable, cereal, and miscellaneous substances had characteristics which differed from products made essentially of meat.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

PB 154 282 $5.60

Marquardt Corp., Van Nuys, Calif.
INVESTIGATION OF THE INTERACTION OF HIGH VELOCITY IONS WITH METALLIC SURFACES, by Edward T. Pitkin, Malcolm A. MacGregor and others. Rept. Oct 59-May 60 on Contract AF 33(616)6844. Oct 60, 57p. 13 refs. ARL Technical rept. 60-299; AD-249 379.

DESCRIPTORS: (*Surfaces, *Metals, Copper, Molybdenum, Tungsten, *Ion bombardment, Erosion, Secondary emission) (*Ion rockets, Propulsion, Electrodes, Erosion) Ion sources, Ion beams, *Electric propulsion.

Quantitative measurements of sputtering yield rates of copper, molybdenum and tungsten surfaces subjected to ion bombardment have been made. Rates were determined by measurements of mass loss with time and were gathered as functions of ion energy, mass and target incidence angle. Ion energies of 10 to 40 kev, a range applicable to ion rocket motors, were studied. Sputtering rates are proportional to ion mass, inversely proportional to incidence angle and hardness of the target, and that a maximum yield rate is exhibited at a beam energy within the range tested. A concurrent analytical phase of this program was the study of ion trajectories by use of a digital computer. A computational code was developed which was capable of mapping out the electrostatic field with various electrode geometries and of determining the ion beam envelope with space charge effects included.

PB 158 511 $12.00

Norair Div., Northrop Corp., Hawthorne, Calif.
DESIGN AND APPLICATIONS OF PROPULSIVE FLUID ACCUMULATOR SYSTEMS, by Sterge T. Demetriades. Feb 60, 169p. 37 refs. Rept. no. NB-60-16.

DESCRIPTORS: *Spaceships, *Propulsion, Electric propulsion, Nuclear propulsion, Rocket propulsion, Ramjet propulsion, Magnetohydrodynamics, Fuel tanks, Refueling in flight, Design, Economics.

This paper summarizes the fundamental morphological study which revealed the advantages of the Propulsive Fluid Accumulator system over conventional rockets and presents a comparison of launch mass, energy and power requirements for various missions where PROFAC is used with various missions where other conventional nuclear, chemical or hybrid systems are used. Frequent refuelling with propulsive fluid collected in orbit and/or on the surface of satellites or planets offers several practical advantages over an increase of specific impulse. The propulsion and other requirements are presented of the Orbital Vehicle used to overcome the drag of collection of air in orbit at altitudes of 90-120 km and the characteristics of a magnetogasdynamic device for electrical orbital propulsion at that altitude are discussed.

PB 158 512 $6.60

Norair Div., Northrop Corp., Hawthorne, Calif.
PRELIMINARY STUDY OF PROPULSIVE FLUID ACCUMULATOR SYSTEMS, by Sterge T. Demetriades. June 60, 63p. 12 refs. ASRL-TM-60-7.

DESCRIPTORS: *Spaceships, *Propulsion, Rocket propulsion, Electric propulsion, Nuclear propulsion, Ramjet propulsion, Fuel tanks, Magnetohydrodynamics, Refueling in flight, Design.

This paper summarizes the fundamental morphological study which revealed the advantages of the Propulsive Fluid Accumulator system over conventional rockets and presents a comparison of launch mass, energy and power requirements for various missions where PROFAC is used with various missions where other conventional nuclear, chemical or hybrid systems are used. Frequent refuelling with propulsive fluid collected in orbit and/or on the surface of satellites or planets offers several practical advantages over an increase of specific impulse.

Manufacturing Equipment and Processes

PB 158 044 $6.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A QUALITY CONTROL MODEL FOR COMPLEX ITEMS, by Joseph Kullback. Technical rept. no. 46 on Contract Nonr-225(53). 29 Nov 60, 65p. 13 refs. AD-248 546.

DESCRIPTORS: (Industrial production, *Quality control, Maintenance), (*Probability, Statistical analysis, Statistical distributions, Sampling, Reliability).

A formulation and analysis is presented of a mathematical model which is useful in resolving certain problems associated with the maintenance of suitable quality levels in the production of complex items. Consider an item composed of many interrelated component parts. These parts are subject to random fluctuations in performance and to random environmental influences so that there is some definite probability less than one that a given item will conform to performance specifications on any given trial. A method

is presented for constructing a large class of consistent asymptotically normal efficient estimates for the parameters of distributions satisfying certain regularity conditions. Another aspect considered is the problem of optimum allocation of k (the number of observations per item). Tables are presented which give the minimizing value of k for certain pairs of positive real parameter points. Asymptotic expressions for the minimizing value of k are also presented. (Author)

PB 158 105 $10.10

Applied Mathematics and Statistics Labs., Stanford U., Calif.
VARIABLES SAMPLING INSPECTION PROCEDURES WHICH GUARANTEE ACCEPTANCE OF PERFECTLY SCREENED LOTS, by W. M. Woods. Technical rept. no. 47 on Contract Nonr-225(53). 30 Nov 60, 127p. 15 refs. Technical rept. no. 47; AD-249 101.

DESCRIPTORS: (*Quality control, Statistical analysis), (*Sampling, Statistical distributions, Analysis of variance).

A variables sampling inspection procedure is derived which guarantees that a lot with no defective items will always be accepted. This procedure is derived for the following cases: (1) the quality characteristic has a density function belonging to a one-parameter exponential family, of which the normal density with known variance is a member, and a single specification limit is given; (2) the quality characteristic has a normal distribution with known variance and two specification limits are given; (3) the quality characteristic is normally distributed with unknown mean and variance and a single specification limit is given; and (4) the quality characteristic is normally distributed with unknown mean and variance and two specification limits are given. (Author)

PB 155 520

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC PROGRAMMING OF NUMERICALLY CONTROLLED MACHINE TOOLS, by Douglas T. Ross. Interim technical rept. 1 July 58-28 Feb 59, on Contract AF 33(038)24007. Nov 59, 155p. 25 refs. Rept. 6873-IR-8 and 6873-IR-9; AD-231 214.

DESCRIPTORS: *Machine tools, Scheduling, *Programming, Automation, Control systems, *Machines, *Digital computers, Automatic, Computers.

The current status and future plans of the APT II [Industrial system] and APT III [Whirlwind] digital computer systems for automatic programming of numerically controlled machine tools is reported. A report of the field trial test results of the industrial APT II System is also included. Additional related investigations into special purpose computers, automatic feedrate setting, the use of five-axis control, and curvilinear interpolation are considered. A description is also included of a Group Control utility routine developed to permit usage of the APT System, or any large digital computer system, on a computer whose core memory is of inadequate size. (Author)

PB 155 521 $10.10

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC PROGRAMMING OF NUMERICALLY CONTROLLED MACHINE TOOLS, by Douglas T. Ross, Clarence G. Feldmann and others. Interim engineering rept. 1 Mar-30 Nov 59, on Contract AF 33(038)24007. Apr 60, 130p. 29 refs. Rept. 6873-IR-10 and 11; AD-240 352.

DESCRIPTORS: Automatic, *Programing, Mathematical computer data, *Control systems, Design, Servomechanisms, Servo systems, *Machine tools, Machine shop practice, Cybernetics, Scheduling, *Electronic systems, Numerical methods and procedures, Digital computers, Computers.

Two Automatically Programmed Tool (APT) systems are being developed, the APT II system for programming by curves, and the APT III system for programming by surfaces. The industrial APT II programs are in Phase I development following the field-trial period. This report describes liaison work with the APT Project, and the features of a re-analysis of the calculation (ARELEM) portion of the APT II system. The final report is given on the Whirlwind APT III studies, and current work on automatic feedrate setting, and automatic selection of initial starting values for iterative procedures is described. Also included are an initial report on the use of computers as an aid to design of parts, to be continued under a new contract, and a report of a trip to machine-tool shows in Paris and Czechoslovakia. (Author)

PB 155 394-7 $6.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM, VOLUME VII, GROUP CONTROL FOR AUTOMATIC MANIPULATION OF COMPUTER PROGRAMS WHICH EXCEED CORE MEMORY, by David F. McAvinn. Rept. on Contract AF 33(038)24007. 8 Feb 60, 61p. AD-240 351.

DESCRIPTORS: Automatic, *Programming, *Memory devices, *Digital computers, Data storage systems, Control systems, Mathematical computer data, Coding, Machine tools.

This report describes the Group Control Program written for the Automatically Programmed Tool (APT) system of programs using the IBM Type 704 Computer. The function of the GC program is to enable the operation of any program which exceeds the capacity of core memory. To use it the programmer first divides his program into segments small enough to fit into core memory and places all the segments into auxiliary storage. In operation, GC automatically brings the segments into core memory as they are needed, and performs the appropriate transfers of computer control. Also described is a set of Loading Programs, which place the segments of an oversized program into auxiliary storage in a form suitable for Group Control operation.

PB 155 522 $4.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
NUMERICAL CONTROL FOR MACHINING WARPED SURFACES, by George Bromfield. Bachelor's thesis. Rept. on Contract AF 33(038)24007. 12 Jan 56, 49p. 13 refs. Engineering rept. no. 14, D. I. C. Proj. 6873; AD-108 343.

DESCRIPTORS: (*Milling machines, Machines, Operation, Control systems) (*Surfaces, Machining) (*Digital computers, Computers, Programming, Numerical methods and procedures).

In order to produce warped surfaces, such as that of turbine-blade dies, on the numerically controlled milling machine, it is necessary to interpolate additional data on the given cross sections and additional cross sections between those given. It is then necessary to determine a set of points on a parallel surface one tool-radius away from the given surface corresponding to the interpolated network of points on the given surface. The resulting data must then be coded fot the milling machine. In the case described in this report, all of the above steps were performed by the M. I. T. digital computer, Whirlwind I. (Author)

PB 155 401 $6.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
OPERATION OF A NUMERICALLY CONTROLLED MILLING MACHINE, by Donald C. Dick. Rept. on Contract AF 33(038)24007. 15 Mar 56, 69p. 1 ref. Engineering rept. no. 17, D. I. C. Proj. 6873; AD-108 057.

DESCRIPTORS: (*Milling machines, Machines, Operation, Control systems), *Cams, Templates, *Forging, *Castings, Machining, (*Computers, Programming, Numerical methods and procedures).

During the machine-evaluation phase of the numerical-control project, 76 actual machine jobs were performed. The data available from each of the jobs records diversity of work which can be performed by the numerically controlled milling machine. (Author)

PB 155 395 $3.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
PAPERS ON AUTOMATIC PROGRAMMING FOR NUMERICALLY CONTROLLED MACHINE TOOLS, by Douglas T. Ross. Technical memo. on Contract AF 33(038)24007. 7 Jan 58, 38p. Rept. no. 6873-TM-3.

DESCRIPTORS: (*Machine tools, *Automatic , *Programming, Control systems), (Mathematical computer data, Coding), (*Digital computers, Computers, Programming, Numerical methods and procedures).

The first paper is descriptive, covering the major developments in programming for numerical control up to the present day. The "APT System" is introduced for combining the human designer, the general purpose computer, and the numerically controlled machine tool for production of complex parts. The second paper is primarily tutorial, describing the philosophy behind the current research developments. The "systematized solution" concept, which is the distinguishing feature of the recent work, appears to be applicable to problem solving in other fields as well as numerical control.

PB 155 406 $5.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
PAPERS ON THE APT LANGUAGE, by Douglas T. Ross and Clarence G. Feldmann. Technical memo. on Contract AF 33(600)40604. June 60, 54p. 6 refs. Rept. no. 8436-TM-1; AD-243 156.

DESCRIPTORS: *Language, *Programming, *Data processing systems, *Machine tools, Servomechanisms, Electronic circuits, Machine translation.

A reproduction of two papers is presented. The first paper describes the motivations and viewpoint which influenced the design of the English-like part programming language of the APT System for automatic programming of numerically controlled machine tools. An example of the current APT System language is given, and future developments are discussed. The second paper essentially takes up where the first leaves off, and describes additional features of the APT Language which are being added to extend its usefulness and generality. Together these papers provide, in a condensed form, a case study description of the evolution of a specially designed language. (Author)

MATERIALS

AD-256 888 $3.60

Applied Psychological Services, Wayne, Pa.
AIRCRAFT DETECTABILITY AND VISIBILITY. III. THE EFFECTS OF VARYING STIMULUS CHARACTERISTICS ON TACHISTOSCOPIC THRESHOLDS, by Arthur I. Siegel and Kenneth Crain. Rept. on Contract N156-38581. Feb 61, 38p. 8 refs. NAMC-ACEL-452.

DESCRIPTORS: Naval aircraft, Detection, Visibility, Visual perception, *Aircraft finishes, *Paints, Fluorescence, Aviation accidents, Countermeasures, Colors, *Color vision, Tachistoscopes, Applied psychology, *Visual thresholds.

The effective stimulus properties of ordinary and fluorescent paint were investigated. The shape, color, perimeter, area, and organization of fluorescent and ordinary paint stimuli were systematically varied and tachistoscopic thresholds obtained. Assuming stimulus "effectiveness" to be directly related to tachistoscopic thresholds, the results suggested that: (1) a single, organized, chromatic stimulus area was more effective than the same stimulus area split and the halves separated by some distance, (2) the greater the separation of the chromatic parts, the less effective was the stimulus, (3) square-like stimuli were more effective than rectangular stimuli, (4) increasing the area of the stimulus increased the effectiveness of a stimulus up to a point; beyond that point increasing area did not increase stimulus effectiveness, and (5) the effectiveness of a combined dichromatic stimulus was greater

than the effectiveness of any of its monochromatic elements taken individually. (Author) (See also PB 153 900)

PB 157 726 $1.10

Army Prosthetics Research Lab., Washington, D. C.
THE H-H METHOD FOR THE DETERMINATION OF COMPARATIVE HARDNESS OF PLASTICS AND PLASTIC-LIKE MATERIALS, by John W. Hodge, Jr. 1 Nov 59, 4p. 1 ref. Rept. no. T.R. 5956; AD-233 137.

DESCRIPTORS: *Plastics, Hardness, Test methods, Test equipment, *Prosthetics, Materials.

The comparative hardness of plastics and plastic-like materials by controlled penetration of a pointer was determined by means of an Instron Testing Machine. The results obtained by this method may be used to determine comparative hardness of other similar materials. (Author)

PB 157 790 $5.60

Bell Aircraft Corp., Buffalo, N. Y.
WORK STATEMENT INFORMATION FOR MATERIALS PROGRAM COVERING COATINGS, INSULANTS AND HIGH TEMPERATURE RESISTANT MATERIALS, by H. A. Pearl, G. Kappelt and others. Rept. on Contract AF 18(600)1607. Rev. 31 Oct 56, rev. 15 5 Aug 58, declassified. 52p. Rept. no. D143-984-001, supersedes rept. dated June 56.

DESCRIPTORS: (*Airframes, Materials), (*Insulating materials, *Refractory materials, *Ceramic materials, *Metals, Coatings, Physical properties, Mechanical properties.)

AD-259 329 repriced $0.50

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
MARINE LAMINATING PROPERTIES OF SELECTED WOOD SPECIES: OUTDOOR EXPOSURE. SECOND PERIOD EXAMINATION, by E. Stahl. June 61, 12p. 5 refs. Evaluation rept. E-412-L1.

DESCRIPTORS: (*Wood, *Laminates, Physical properties, Tests, Climatic factors), Adhesives, Phenols, Resorcinal, Resins.

Outdoor weathering exposure evaluations of delamination developed in approximately one year in laminated beams of eleven domestic and foreign wood species indicate a general slight increase over the initial exposure period. Laminated teak is an exception in that delamination has been progressive over the period. (Author)

AD-257 469 $5.60

National Research Labs., Ottawa (Canada)
THE PROPAEDEUTICS OF NATURAL, SYNTHETIC AND BENEFICIATED ASBESTOS, by J. M. Trenouth. Mar 61, 54p. 56 refs. Mechanical engineering rept. MS-105; N.R.C. no. 6248.

DESCRIPTORS: *Asbestos fiber, *Synthetic fibers, *Manufacturing methods, Industrial production, Preparation, Production, Material, Fibers, Physical properties, Crystal structure.

The results of a literature survey on natural and synthetic asbestos are presented. Specifically, the following topics have been dealt with: (1) varieties and compositions, (2) origin, (3) physical properties, (4) structure, (5) synthesis, (6) beneficiation, and (7) substitutes. The main purpose of this survey was to study past attempts to synthesize asbestos, the other topics merely serving to provide background knowledge of the material. For this reason the section on synthesis has been covered as completely as possible but no claim as to the completeness of the other sections is made. The survey shows that, to date, no method has been devised to synthesize asbestos fibres of any appreciable (and hence, useful) length. However a number of avenues for future research in this field have been opened and it is expected, in the near future to be able to investigate these more fully in an effort to synthesize asbestos of commercial significance. (Author)

PB 158 503 $7.60

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL RADIATION DAMAGE TO CELLULOSIC MATERIALS. PART II. IGNITION OF ALPHA CELLULOSE BY SQUARE-WAVE EXPOSURE, by C. P. Butler, S. B. Martin, and W. Lai. 26 Nov 56, 77p. 29 refs. Research and development technical rept. USNRDL-TR-135; AFSWP-906.

DESCRIPTORS: (*Cellulose, Thermal radiation, Ignition, Radiation damage, Physical properties) (*Textiles, Ignition, Physical properties) (*Newspapers, Ignition, Physical properties), (Cotton, Ignition)

The ignition behavior of blackened alpha-cellulose when exposed to square-wave inputs of radiant thermal energy is detailed for a wide range of irradiance levels and exposure times (0.4 to 25 cal/cm^2/sec and 0.1 to 100 sec exposure). The data resulting are correlated to a single ignition behavior pattern using grouped parameters derived from considerations of diffusion of heat. Physical significance of the shape of the ignition behavior curve is discussed in terms of temperature attainment and subsequent pyrolytic processes.

PB 158 496 $4.60

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY, by S. S. Cole, Jr., H. W. Larisch and others. Technical note no. 3 for 30 Dec 59-31 Mar 60 on Contract AF 30(602)2047. Apr 60, 47p. 4 refs. Sperry rept. no. NA-8240-8184-3; RADC-TN-60-108; AD-240 969.

DESCRIPTORS: *Seals, *Metal seals, *Ceramic materials, Aluminum compounds, Oxides, Tensile properties, Design, Bonding, Electron tubes.

A search is being made of the current literature on ceramic-to-metal seals. Adherence tests continued on sintered metallizing mixtures. The trends noted on the mixtures sintered at 1500°C appeared to hold over a range of sintering temperatures. The metallizing generally seemed to adhere better to the 94% alumina

body than to those bodies containing a higher alumina content. Torque peel tests were conducted on the same metallized ceramic disks used in adherence tests. In general, the results support adherence data. Compression tests indicated that when the same metallizing is applied to several bodies compression values are higher for those bodies of the lower alumina content except mixtures of R-39 and R-50 containing SiO_2. Maximum values were slightly over 5000-lb loads. The tensile test specimen was redesigned with a radius of 21/64. Preliminary tensile stress-strain tests were performed at room temperature on several transverse specimens machined from nickel tube and both 18-8 stainless steel bar and sheet stocks. The sheet stock test results were more reproducible. A comparison of test methods indicated that a tensile value of 25,000 psi is equivalent to a compression test value of 5200 lb, drum peel of 17.25 lb, and torque peel value of 6 1/8 in.-lb. The compression test displayed the smallest coefficient of variation. Seal strengths of about 25,000 psi are expected when tensile tests are performed. (See also PB 157 799)

Fuels, Lubricants, and Hydraulic Fluids

AD-258 562 repriced $3.00

Little, Arthur D., Inc., Cambridge, Mass.
HANDBOOK FOR HYDROGEN HANDLING EQUIPMENT, by A. W. Adkins, I. A. Black and others. Rept. 11 Apr 60-31 Apr 61, on Contract AF 33(616)7330, continuation of Contract AF 33(616)5641. May 61, 155p. 20 refs. WADC Technical rept. 59-751, Supplement no. 1.

DESCRIPTORS: *Handbooks, *Handling, *Hydrogen, Safety, *Gas cylinders, Reliability, Design, Specifications, Pumps, Economics, *Gas pumps, *Vacuum bottles, Pipe fittings, *Vacuum pumps, *Liquefied gases.

Section I establishes the current availability and specifications for liquid hydrogen pumps and cites the operational experience reported by the major users of these items. Section II sets forth a tested method for predicting the hydrogen gas required for the pressurized transfer of liquid hydrogen. Section III recounts the known facts relating to the safety and reliability of hydrogen gas cylinders as used in typical operations for the pressurized transfer of liquid hydrogen. Section IV presents the design specifications and performance characteristics of gravity-fed and boosted pressure-fed vaporizers for liquid hydrogen transfers established as a result of an integrated program of theoretical analysis and tests. Section V includes an economic comparison of systems using pumps, hydrogen vaporizers and high-pressure hydrogen gas bottles to transfer liquid hydrogen. Section VI presents the results of a further investigation of the single parting line coupling for vacuum-jacketed transfer lines originally reported in WADC TR-59-386. A modified design and its performance characteristics established from tests are included. (Author)

PB 154 876 $1.60

National Research Labs., Ottawa (Canada)
ON THE EVAPORATION AND DECOMPOSITION OF DROPLETS OF LIQUID OZONE-OXYGEN MIXTURES IN A HOT OXYGEN ATMOSPHERE, by R. Sandri. Dec 60, 19p. 11 refs. Mechanical engineering rept. MP-19; N.R.C. no. 6157; AD-252 967.

DESCRIPTORS: Drops, *Evaporation, *Decomposition, *Ozone, *Oxygen, Mixtures, *Liquefied gases, *Fuels, Oxidizers, Fuel sprays, Mathematical analysis, Fuel injection, *Vaporization, *Combustion, Gases, Chemical research.

Evaporation rates and lifetimes of droplets of a 50-50 mole percent ozone-oxygen mixture in a hot oxygen atmosphere at 20 atmospheres pressure were calculated by means of electronic computers under the assumption that the temperature and concentration fields were in a quasi-steady state and that the interior of the liquid was at a uniform, constant temperature except in a thin layer adjacent to the surface. The numerical results thus obtained can be represented by simple formulae. The lifetime curve approaches a straight line except for very small droplet radii. The lifetimes of these droplets are much shorter than those of droplets of other oxidizers and fuels under comparable conditions. This should hold, although to a lesser degree, also for mixtures less rich in ozone, even below the ordinary flammability limit. (Author)

PB 154 259 $2.60

Rocket Research Lab., Ohio State U., Columbus.
EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE FLUID DYNAMICS OF ROCKET COMBUSTION, by Loren E. Bollinger, Michael C. Fong and others. Interim technical note on Research on the Fluid Dynamics of Rocket Combustion, Contract AF 33(616)5615. Nov 60, 30p. 13 refs. ARL Technical note 60-141; AD-249 696.

DESCRIPTORS: Fluid mechanics, *Detonation, *Detonation waves, Shock tubes, Magnetic fields, Hydrogen, Oxygen, Ignition, *Combustion, Gases, Mixtures, Shock waves, Combustion chamber gases, Gas ionization.

The effect of transverse magnetic fields on the formation of detonation waves was studied with H-O mixtures in a 50mm diam. cylindrical tube. Both steady-state and oscillating (60 cps) fields were employed. The results showed that both types of fields inhibited the formation of the detonation wave. The inhibition caused by a 30 gauss ac field was greater than that produced by a 1000 gauss dc field with the magnet coils located in the same region of the induction zone. The effect of a transverse magnetic field on a plane discontinuity surface with heat release, the following results have been obtained: (i) when the entire medium is assumed to be ionized, the changes across this discontinuity surface are found to be similar to that of a hydromagnetic shock problem; (ii) when ionization is produced by the discontinuity surface and when a uniform transverse magnetic field is present in the entire fluid medium, the changes across the discontinuity surface are described by the equations for an ordinary detonation or deflagration wave; (iii) same

as in (ii) except that magnetic field is of finite extent. The treatment of this problem is found to be similar to that of a detonation or deflagration wave passing through a stationary obstruction. (Author)

PB 154 413 $2.60

Rocket Research Lab., Ohio State U., Columbus.
RESEARCH ON COMBUSTION PHENOMENA AT HIGH PRESSURE, by Rudolph Edse and William A. Strauss. Interim summary technical rept. 1 Jan-31 Dec 59, on Contract AF 33(616)5439. Feb 61, 29p. 12 refs. ARL Technical note 60-152; AD-254 362.

DESCRIPTORS: Gases, Carbon compounds, Fuels, Monoxides, Oxygen, Hydrogen, Methanes, Chlorine compounds, Bromides, Propellants, *Gaseous rocket propellants, *Combustion, Pressure, High pressure research, Oxidizers, *Rocket fuels, Fuel additives, *Rocket oxidizers, Flames, Test equipment

The effect of pressure and additives on the limits of flammability and burning velocities of various fuel-oxidizer gas mixtures are reported. Rich CO-air and CH_4-air flammability limits shift to lean mixtures as the pressure is raised from 1 to 40 atm after which the flammability limit region widens. The lean fuel-air flammability limits shift to richer mixtures up to 40 atm. after which they become constant. The rich and lean CH_4-O_2 and H_2-O_2 flammability limits widen slightly with rising pressures. The addition of 2 vol-% of CH_3Br to the CO-O_2 system increases the burning velocity while the addition of 1/2% CH_2ClBr reduces the burning velocity. The burning velocities of CH_4-O_2 mixtures increased when the above additives are used. The burning velocities of H_2-air mixtures increase slightly with pressure increases in the 1 to 15 atm range and decrease as the pressure was further raised to 40 atmospheres. (Author)

MATHEMATICS

PB 158 047 $7.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
DIFFERENCE KERNELS, by Marvin Shinbrot. Technical rept. no. 92 on Contract Nonr-225(11). 25 Nov 60, 77p. 20 refs. AD-247 066.

DESCRIPTORS: (*Integral equations, Difference equations, Functions, Real variables, Integral transforms, Fourier analysis.)

A study on the inversion of integral equations is presented. The range over which the equation is valid is restricted to a finite interval, and, for uniqueness, the function of the integral is required to be zero outside the interval. Some properties of the Fourier transform of the kernel is derived. The kernel is shown to be able to be factored. The factorization is important because it allows the inversion to be reduced to a Fredholm equation. The problem is formulated in terms of Fourier transforms, and an heuristic sketch of the method of attack is presented. Theorems are then stated and proved. Some counterexamples are presented to show that the results are the best possible in certain ways.

PB 158 087 $1.10

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ELEMENTARY PROOFS OF PROPOSITIONS ON LEONTIEF-MINKOWSKI MATRICES, by D. V. T. Bear, D. Jorgenson, and H. M. Wagner. Technical rept. no. 91 on Contract Nonr-225(50). 21 Nov 60, 10p. AD-248 053.

DESCRIPTORS: (*Matrix algebra, Theory), Series.

Three well known and fundamental propositions relating to Leontief-Minkowski matrices (A) are proved: (1) the inverse matrix of (I - A) exists, (2) the matrix power series converges to the inverse matrix of (I-A), and (3) the elements of the inverse matrix of (I - A) are non-negative. (Author)

PB 158 045 $2.70

Applied Mathematics and Statistics Labs., Stanford U., Calif.
MARKOV RENEWAL PROCESSES OF ZERO ORDER AND THEIR APPLICATION TO COUNTER THEORY, by Ronald Pyke. Technical rept. no. 64 on Contract Nonr-225(52). 21 Nov 60, 25p. 9 refs. AD-248 337.

DESCRIPTORS: (Supplies, *Scheduling), (*Statistical processes, Statistical analysis, Probability, Statistical distributions), *Operations research, (*Geiger counters, Statistical processes).

A special class of Markov Renewal processes are studied in which the embedded Markov Chains are of zero-order. The distribution theory both exact and asymptotic of the number of visits to a state is studied. A special case arising in counter theory is described and the corresponding results stated. Interest in more general Markov Renewal processes and this special case was motivated by the problem encountered where impulses emitted from a radioactive source are to be detected by a Multiple Channel Analyzer. (Author)

PB 157 446 $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
OPTIMAL ACCELERATION LIFE DESIGNS FOR ESTIMATION, by Herman Chernoff. Technical rept. no. 63 on Contract Nonr-225(52). 19 Oct 60, 37p. 4 refs. AD-245 957.

DESCRIPTORS: (*Life expectancy, *Statistical tests, Factor analysis, Numerical methods and procedures).

A technique is developed to obtain optimal accelerated life designs for estimating the mean lifetime of a device under a standard environment. Five problems involving variations of models and experimental setup are studied. The general approach, applying a method of Elfving, (Ann. Math. Stat. 23:255-262, 1952) is applicable to a large variety of models. (Author)

PB 157 537 $8.10

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A SURVEY OF TIME SERIES ANALYSIS, by Emanuel Parzen. Technical rept. no. 37 on Contract Nonr-225(21). 30 Sep 60, 83p. 54 refs. AD 245 433.

DESCRIPTORS: (*Statistical analysis, Series, Statistical processes), Functional analysis.

Contents:
A time series is an observation on a stochastic process
Stationary time series
The problem of minimum mean square error linear prediction
Hilbert space representations of time series
Examples of reproducing kernel Hilbert space representations
Regression analysis of time series with known covariance function
The probability density functional of a normal time series
Correlation analysis and spectral analysis of stationary regression free time series

PB 157 445 $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
SEQUENTIAL TESTING OF TRUNCATION PARAMETERS (LARGE SAMPLE THEORY), by Gideon Schwarz. Technical rept. no. 62 on Contract Nonr-225(52). 17 Oct 60, 17p. 4 refs. AD-245 956.

DESCRIPTORS: (*Sequential analysis, *Statistical tests, *Sampling, Statistical distributions, Probability).

The asymptotic shape approach to large sample theory of sequential testing is derived for the case of hypotheses about a truncation parameter. The results cover the case of a fixed-distribution truncated at an unknown point and the case of a distribution that belongs to a Koopman-Darmois family and is truncated at an unknown point. In the latter case, the Koopman-Darmois parameters appear as nuisance parameters. (Author)

PB 157 353 $1.10

California U., Los Angeles.
SAMPLE DISTRIBUTION OF MEAN WAITING TIME IN QUEUES, by James R. Jackson. Rept. on Management Sciences Research Project, Contract Nonr-233(02). 20 Sep 60, 4p. Research rept. no. 67; AD-244 669.

DESCRIPTORS: (*Probability, Statistical distributions, *Sampling, Errors) (Digital computers, Computers, Mathematical computer data), Simulation.

Sampling errors in the estimation of equilibrium statistics are considered by examining the distribution of sample values of mean waiting time in a very simple queue, for selected values of the utilization ratio and of the number of customers whose processing is simulated. The results are estimates of the standard deviations of sample estimates of mean waiting time.

A suggestion is given which may help in the design of future queueing simulations. (Author)

PB 157 425 $6.60

Columbia U., New York.
ASYMPTOTIC SHAPES OF OPTIMAL SAMPLING REGIONS IN SEQUENTIAL TESTING, by Gideon Schwarz. Rept. on Contract Nonr-266(59). 29 Sep 60, 62p. 18 refs. CU-20-60-Nonr-266(59)-MS; AD-245 786.

DESCRIPTORS: (*Sequential analysis, *Sampling, *Statistical tests, Probability, Statistical distributions).

The concept of asymptotic shape for parametrized families of regions in n-dimensional Euclidean vector space is presented. The main tool in proving the existence of the asymptotic shapes and finding them explicitly is a special class of regions which are characterized by constant a posteriori risk of stopping along their boundaries. Inclusion relations are expressed between this class of regions and the unknown Bayes regions. Asymptotic shapes of the regions in the (N, S) space that correspond to the constant risk boundaries in the space of a posteriori distributions are exhibited, where N is the ordinal number of observation and S is a statistic which sums up the relevant information obtained through the N first observations. Two problems in which S is a two-dimensional vector are considered: (1) the student problem of testing whether the mean of a normal distribution with unknown variance is positive or negative, and (2) the problem of three arbitrary distributions. The asymptotic average sample size curves of the Bayes procedures are obtained.

PB 158 114 $2.60

Columbia U., New York.
NON-INCREASE EVERYWHERE OF THE BROWNIAN MOTION PROCESS, by A. Dvoretzky, P. Erdos, and S. Kakutani. Rept. on Contract Nonr-266(59). [1960] 30p. 4 refs. CU-21-60-Nonr-266(5)-MS; AD-245 787.

DESCRIPTORS: (*Statistical processes, Probability, Statistical functions.)

The Brownian motion process can be described as a probability space whose elements are all continuous functions defined on the whole real line and vanishing at the origin. A proof is given that the probability of the set of functions which increase at least at one point is zero. A function is said to increase at a point if its values slightly to the right (left) of this point are not smaller (larger) than its value at the point. (Author)

NYO-9456 $1.60

Massachusetts Inst. of Tech., Cambridge.
DESCRIPTION OF METHOD FOR DETERMINING GEOMETRIC PARAMETERS OF SURFACES IN CONTACT. Semi-annual progress rept. Sep 60-Apr 61, on Contract AT(30-1)-2079. May 61, 16p.

NDA-2092-5 $7.60

Nuclear Development Corp. of America, White Plains, N. Y.
A DESCRIPTION OF MONSTER, A DIGITAL COMPUTER PROGRAM FOR A MONTE CARLO REACTOR SHIELDING CALCULATION, by Florence J. Oswald, Roberta Schaffer, and Hermann V. Waldinger. Rept. on Contract (AT74)-ANPG-05339. June 58, 51p.

PB 153 479-1 $2.60

Physics, Engineering, Chemistry Corp., Boulder, Colo.
APPLICATION OF ASYMPTOTIC FORMULAE TO THE STUDY OF SINGULAR BOUNDARY PROBLEMS. PART I. A CLASS OF INDEFINITE BOUNDARY VALUE PROBLEMS, by Robert McKelvey. Rept. on Mathematical Techniques of Aero-Mechanics, Contract AF 33(616)6748. Dec 60, 21p. 3 refs. ARL Technical rept. 60-329, Part I; AD-252 809.

DESCRIPTORS: *Differential equations, Series, *Applied mathematics, Aeronautics, Numerical methods and procedures.

A study is made of the differential boundary value problem. The principal result concerns the asymptotic distribution of the eigenvalues of the system. The derivation of this result depends upon the known asymptotic solutions of the differential equation, and upon the theory of exponential sums. (Author)

PB 157 192 $2.60

Rutgers State U. [New Brunswick, N. J.]
CALCULUS OF VARIATIONS AND OPERATIONS RESEARCH, by John M. Danskin. Rept. on Mathematical Techniques of Aeromechanics, Contract AF 33(616)5318. Dec 60, 25p. 7 refs. ARL Technical note 60-151; AD-254 107.

DESCRIPTORS: *Operations research, *Calculus of variations, Mathematics, Games theory.

The role of mathematics, especially the calculus of variations, in operations research is discussed, and some problems of operations research that lead to interesting mathematics are exhibited. The first such problem is that of distributing a given amount of available resources among various alternatives so as to obtain the maximum return. When the number n of alternatives is finite, this is a problem in ordinary calculus, but when n is infinite, it becomes a problem in calculus of variations; solutions are given for both. The most interesting cases are the ones in which the return function is s-shaped (first convex, then concave). Examples are given of the application of these results, together with game theory and topology, to the solution of a stock-piling problem, a two-machine-gun duel problem, and a problem involving mixed strategies over function spaces. Some suggestions are given for the solution of nontrivial min-max problems. (Author)

SCTM-114-61(25) $0.50

Sandia Corp., Albuquerque, N. Mex.
A NOMOGRAPH FOR SINGLE-SAMPLING PLANS BY ATTRIBUTES, by R. V. Panos. Aug 61, 16p.

AD-256 487 $1.60

Virginia U., Charlottesville.
DEVELOPMENTS IN TOPOLOGICAL ANALYSIS, by G. T. Whyburn. Technical note no. 22 on Topology and Mathematical Analysis, Contract AF 49(638)72. Dec 60, 19p. 8 refs. AFOSR-52.

DESCRIPTORS: *Mathematics, Mathematical analysis, *Topology.

The conclusions of Connell's and Porcelli's papers are fitted into a simpler and still more natural sequence of deductions of classical theorems of complex variable analysis from a topological base.

AD-256 485 $1.10

Virginia U., Charlottesville.
DIFFERENTIABLE INVOLUTIONS, by P. A. Conner and E. E. Floyd. Technical note no. 21 on Topology and Mathematical Analysis, Contract AF 49(638)72. Sep 60, 9p. 5 refs. AFOSR-TN-60-1252.

DESCRIPTORS: Mathematics, *Topology, Groups (Mathematics).

In the study of fixed point free involutions a scheme is given for classifying the differentiable involutions without fixed points on closed mainfolds according to equivariant cobordism type. Interest in preparing this work was stimulated by a desire to make more effective use of assumptions of differentiability in studying transformation groups.

AD-256 043 $3.60

Virginia U., Charlottesville, Va.
FIXED POINT FREE INVOLUTIONS AND EQUIVARIANT MAPS, by P. E. Conner and E. E. Floyd. Technical rept. no. 18 on Topology and Mathematical Analysis, Contract AF 49(638)72. [1960] 40p. 19 refs. AFOSR-TN-60-719.

DESCRIPTORS: *Algebraic topology, *Topology.

Portions of this report will not reproduce well.

Contents:
Equivariant maps
The index and the co-index
Cohomology co-index
The suspension of an involution
The involution of a sphere bundle

Computing Devices

PB 158 043 $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
SOME OBSERVATIONS ON ALGOL IN USE (BURROUGHS 220), by John G. Herriot. Technical rept. no. 9 on Contract Nonr-225(37). 7 Nov 60, 16p. 1 ref. AD 247 022.

DESCRIPTORS: (Digital computers, *Computers, *Programming, Language) (*Mathematical computer data, Coding).

AD-257 403 $4.60

Columbia U. [School of Engineering] New York.
RESEARCH ON SAMPLED DATA FEEDBACK CONTROL SYSTEMS, by George M. Kranc. Final rept. 1 June 53-30 Nov 61 on Contract AF 18(600)677. 1 May 61, 45p. 40 refs. CU-66-61-AF-677-EE; AFOSR-666.

DESCRIPTORS: (Data, Sampling, Feedback, Control systems, Theory), (Linear systems, Analysis, Synthesis, Transformations (Mathematics)), (Analog computers, Digital computers, *Data storage systems, *Data processing systems, Design).

Research is presented in the field of control systems; particularly in the field of sampled data systems. Investigations demonstrated the feasibility and superiority of the Z-transform methods for linear sampled data systems. The Z-transformation was recognized as the effective tool for the analysis and synthesis of the linear sampled systems. A radically new concept in sampled-data compensation techniques was developed. The work on various synthesis problems yielded new analytical techniques utilizing Z-transforms as the main tool of the investigations. A particularly novel approach to the design of sampled systems was also developed. A sampled data processing unit was constructed based on analog multiplication and digital storage. Work was also carried out in the field of continuous systems. (Author)

PB 155 399 $4.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC SELECTION OF INITIAL VALUES FOR ITERATIVE PROCEDURES, by Robert B. Polansky. Master's thesis. Technical memo. on Contract AF 33(038)24007. Sep 59, 50p. 7 refs. Rept. no. 6873-TM-12; AD-231 216.

DESCRIPTORS: Functions, *Real variables, Complex variables, Numerical methods and procedures, Digital computers, *Programming, Operation, Computers.

A method for selecting initial or starting values for iterative procedures is described. This method solves, when used with an appropriate iterative procedure, the problem of finding the zeros of arbitrary functions of N variables. Provision is also made for simultaneously satisfying auxiliary constraints of the type $G(X_1, \ldots, X_N) > 0$ and auxiliary conditions of the type $H(X_1, \ldots, X_N) = 0$ where $X_1, \ldots, X_N$ are the variables of the arbitrary given function. The method of obtaining initial values is a generalized scanning procedure. A program which uses this method for selecting initial values has been written for the IBM 704 digital computer. The results of several test cases are also presented. (Author)

PB 155 409 $2.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
COMPUTER-AIDED DESIGN: A STATEMENT OF OBJECTIVES, by Douglas T. Ross. Technical memo. on Contract AF 33(600)40604. Sep 60, 27p. Rept. no. 8436-TM-4; AD-252 060.

DESCRIPTORS: *Scientific research, Design, Test equipment, *Computers, Programming, Manufacturing methods, Language.

The Computer-Aided Design Project was conducted to evolve a man-machine system which will permit the human designer and the computer to work together on creative design problems. This analysis states the philosophy of approach being used by the computer applications group of the project. A companion document, (PB 155 410), states the philosophy of the design and graphics group. From the computer applications point of view the primary problem is not how to solve problems, but how to state them. It is proposed that outside-in problem statement, in which a problem is described first in general terms and then refined and made precise by further elaborative statements, is required, rather than the inside-out problem statement form which characterizes present computer programming. General problems are viewed as internally structured by means of interconnected objets. An objet is an abstract entity of meaning, and the computer's understanding of a problem is represented by the structure connecting the objets of the problem. (Author)

PB 155 410 $1.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
COMPUTER-AIDED DESIGN RELATED TO THE ENGINEERING DESIGN PROCESS, by S. A. Coons and R. W. Mann. Technical memo. on Contract AF 33(600)40604. Oct 60, 18p. Rept. no. 8436-TM-5; AD-252 061.

DESCRIPTORS: *Digital computers, *Mechanical engineering, Design, *Data processing systems, *Engineering, Manufacturing methods, *Programming, Stresses, Determination, Drafting.

The objective of the Computer-Aided Design Project is to evolve a man-machine system which will permit the human designer and the computer to work together on creative design problems. The engineering design process is viewed as a stochastic iterative process in which a recognized human need leads to a preliminary tentative concept of a means for its achievement. The manpower-time requirements for proceeding from the original design concept to its realization in a manufactured part, device, or system are investigated, with a view to determining where best to begin consideration of computer aids in the sequence. In general, the conclusion is drawn that for the present the computer can be most effective in replacing manpower in routine drafting, minor design decisions, engineering computation occurring in analyses, (particularly stress computations) and as an aid in the selection of standard parts. (Author)

PB 155 396 $7.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
A DIGITAL COMPUTER ANALYSIS METHOD FOR SIMPLE ENGLISH SENTENCES, by Clarence G. Feldmann. Master's thesis. Technical memo. on Contract AF 33(038)24007. July 59, 76p. 11 refs. Rept. no. 6873-TM-9; AD-229 039.

DESCRIPTORS: *Digital computers, Computers, Mathematical computer data, Coding, *Language, Metamathematics, Machine translations.

A method is presented of conveying meaning to a digital computer by means of simple English sentences. The basic method used is to transform the sentences into a numerical meta-language which is more natural and convenient for use by the computer. During the transformation process, the information contained in the sentences is considered to pass through various language levels. The numerical meta-language is the final level in this process. The major level transformation is from grammatical structure patterns into thought groups. This jump is accomplished through processes analogous to several mathematical analysis techniques. Once the transformation from English to meta-language has been completed, the information being conveyed is in a form which may be easily used by computer logic routines to control the operation of computer calculation routines or to be retranslated back into other languages. (Author)

PB 155 408 $9.10

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
A DIGITAL COMPUTER REPRESENTATION OF THE LINEAR, CONSTANT-PARAMETER ELECTRIC NETWORK, by Charles Shelly Meyer. Master's thesis. Technical memo. on Contract AF 33(600)40604. Aug 60, 110p. 21 refs. Rept. no. 8436-TM-3; AD-248 437.

DESCRIPTORS: Topology, Digital computers, *Electrical networks, Matrix algebra, *Programming, Synthesis.

A digital computer routine resulting in a set of equations that can be solved for the branch currents or branch voltages of a linear, constant-parameter electric network is described. Topological relations are defined; and a matrix equilibrium equation, based on these relations, forms the desired representation. Advantages are obtained from the unique branch numbering system which affords the circuit analyst the opportunity of specifying tree or link branches. Other existing computer routines are studied, and a comparison is made with the method of this research. Detailed flow charts are presented, and a sample circuit is analyzed. (Author)

PB 155 405 $12.00

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATIONS IN COMPUTER-AIDED DESIGN, by Douglas T. Ross, Nathan S. Bromberg and others. Interim engineering rept. 1 Dec 59-30 May 60, on Contract AF 33(600)40604. Jan 61, 161p. 6 refs. Rept. 8436-IR-1; AD-252 062

DESCRIPTORS: *Digital computers, *Programming, *Mechanical engineering, Machine tools, Mathematical logic, Design, *Data processing systems, Data storage systems, Stresses, Determination, Mathematical analysis.

The application of the concepts and techniques of modern data processing to the design of mechanical parts is being studied. Automatic programming (APT) systems are being developed for numerically controlled machine tools. Topics covered include a generalized technique for utilizing computer storage; a general description of the new calculating program for the APT System for numerical control programming; techniques for the evaluation of simultaneous logical functions; a summary of a computer routine for constructing a three-dimensional description of an object from orthographic projections; descriptions of the light pen and light cannon (photosensitive devices for transmitting human-modulated signals from the output scope back into the computer) and associated picture-language forms; conclusions on the study of automatic feedrate regulation in metal cutting; studies of stress calculations and other mathematical techniques for design; standard part selection by computer; and mechanical devices for graphical input to a computer. (Author)

PB 155 407 $5.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
METHOD FOR COMPUTER VISUALIZATION, by Albert F. Smith. Master's thesis. Technical memo. on Contract AF 33(600)40604. Sep 60, 57p. 2 refs. Rept. no. 8436-TM-2; AD-248 436.

DESCRIPTORS: Visibility, *Programming, *Three-dimensional display systems, Mechanical engineering.

A computer program was developed for producing a 3-dimensional description of an object from a 3-view orthographic projection of that object. A number of restrictions were placed on the types of objects the program will handle. The most important of these is that the object must be bounded by surfaces which are simply connected plane regions. The three views of the given orthographic projection are viewed as point-line structures. From the given 2-dimensional structures a 3-dimensional point-line structure is built up in which all the lines and points which could possibly exist are represented. After fixing as many points and lines of this structure as possible, the program sets up a structure listing all the plane surface regions which could possibly exist. Additional operations enable the program to fix or eliminate some of these planes along with more points and lines. If it is possible to fix or eliminate all the planes a solution is reached and the program determines which side of each of the fixed planes is solid, and is finished. If this is not possible, an attempt is made to present several alternate solutions to the problem. Detailed flow diagrams of most of the program are given. The program has not yet been coded for computer testing but hand calculation indicates that it should operate successfully in most cases. (Author)

PB 153 801 $2.60

Naval Research Lab., Washington, D. C.
READOUT CONTROL UNIT FOR AUTOMATIC TYPE-PUNCH SYSTEMS, by J. W. Butler. 13 Feb 61, 23p. NRL rept. 5587; AD-252 384.

DESCRIPTORS: *Data processing systems, Computers, *Digital computers, Typewriters, Automatic, Coding, Design, Switching circuits, Relays, Control systems, Wiring diagrams.

The design and construction of a control unit for automatically transferring data from the memory of a 256-channel pulse-height analyzer to an automatic type-punch system are described. The data are then available in both printed and punched-tape form. The punched tape is coded for the Narec (the Naval Research Laboratory computer) and can be fed directly into the Narec without further processing. The hexadecimal system is used, but the control unit can be adapted for use with the decimal system and for almost any type of computer. On the particular control unit described here, a single switch provides for alternate use of the Royal McBee LGP-30 code. Provision is also made for the simultaneous operation of a chart recorder so that all three methods of data recording-printing, punching, and plotting-may be performed concurrently. The system described has a wide range of applicability. It can be adapted to any source of information in binary form and to any recording equipment which can utilize binary information in the form of relay closures. (Author)

PB 181 065 $1.75

Navy Electronics Lab., San Diego, Calif.
AUTOMATIC DEVICES FOR RECOGNITION OF VISIBLE TWO-DIMENSIONAL PATTERNS: A SURVEY OF THE FIELD, by Otis N. Minot. Rept. for Jan 58-May 59. 13 June 61, 60p. 45 refs. Research rept. no. 1050.

DESCRIPTORS: Automatic, Electronic equipment, *Computers, *Reading machines, *Memory devices, Data storage systems, *Identification systems.

The report surveys the general principles of automatic pattern recognition and the existent techniques for automatic recognition of two-dimensional visible patterns. Scientific, commercial, and military applications are emphasized. (Author)

OTS SB-474 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
DATA PROCESSING AND PROGRAMMING. Aug 61, 26p. 373 refs. OTS Selective Bibliography SB-474.

DESCRIPTORS: Data, *Programming, *Data processing systems, *Bibliography, Coding, Machine tools, Automatic, Computers, Mathematical computer data, Sampling, Errors, Analysis, Photographic recording systems.

Lists 373 foreign and domestic references on data programming, processing, and coding; automatic programming of machine tools; linear programming by computers; mathematical computations; sampled data systems; automatic error analysis; photographic data recording; automatic coding systems and the like.

MECHANICS

Aerodynamics and Pneumatics

PB 147 140 $2.60

Air Materiel Command, Wright-Patterson AFB, Ohio.
PRELIMINARY INVESTIGATION AND EVALUATION OF THE COANDA EFFECT, by Luther J. Boyer (Purdue U. School of Aeronautics). Aug 48, declassified 20 May 49, 30p. 17 refs. Technical rept. F-TR-2207-ND; ATI-26895.

DESCRIPTORS: (*Fluid flow, Deflection, Tests methods, Test equipment, Pressure)

Tests were conducted on a simple two-dimensional model, to study the effect of varying certain physical characteristics, such as flap angle and length, orifice overhang, and slot height, which were believed to affect the phenomena. Conditions of stable flow were investigated, and the relationships between the possible variables were determined. The theory of a starting vortex as causing the deflection of the issuing stream, and adherence to a surface at an acute angle from the normal stream axis, is explained. This investigation indicates the optimum conditions for certain variables affecting the phenomena, and shows the possible reduction in the fluid pressure issuing from such an orifice, which may be useful in augmenting the mass rate of flow of a jet. (Author)

PB 152 585 $11.50

Curtiss-Wright Corp., Santa Barbara, Calif.
FREE FLIGHT HYPERSONIC HEAT TRANSFER AND BOUNDARY LAYER TRANSITION STUDIES: HTV FLIGHTS A-40 AND A-41, by James E. Brunk and Warren N. White. Rept. on Contract AF 33(616)6656. Dec 60, 157p. 73 refs. ARL Technical rept. 60-311; AD-253 021.

DESCRIPTORS: (*Heat transfer, Re-entry vehicles, *Re-entry aerodynamics, Guided missile noses, Blunt bodies, Turbulent boundary layer, Laminar boundary layer), *Hypersonic flow, *Hypersonic test vehicles.

Two HTV-1 hypersonic test vehicles, rounds A-40 and A-41, were flown with blunted and sharp 20 degree half angle nose cones, respectively. Round A-40 also incorporated nose cone incidence and a pitch disturber rocket. A maximum flight velocity of 5800 feet per second was attained, corresponding to a local sharp cone Mach number and unit Reynolds number of 3.4 and 50 x 10 to the 6th power per foot respectively. (Author)

PB 157 810 $2.60

Guggenheim Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
NEARLY FREE MOLECULAR FLOW THROUGH AN ORIFICE, by Roddam Narasimha. Rept. on Contract Nonr-220 21. Oct 60, 25p. 9 refs. AD-245 314.

DESCRIPTORS: (*Orifices, *Gas flow, Analysis), Fluid mechanics, Superaerodynamics.

An estimate is made of the deviation of mass flow m through an orifice from its limiting free molecular value m^0. Using a method proposed by Willis (Princeton Univ. Rep. 442, 1958) it is shown that this deviation is of the first order in ϵ, the inverse Knudsen number, defined as the ratio of the radius of the hole to the mean free path in the gas at upstream infinity. An estimate of the coefficient is obtained making some reasonable assumptions about the three-dimensional nature of the flow, and the value so derived, giving $m = m^0 (1 + 0.20\epsilon)$, shows fair agreement with the measurements of Liepmann (Gaskinetics and Gasdynamics of Orifice Flow, J. Fluid Mech. 1960).

PB 157 365 $3.60

Institute of Flight Structures, Columbia U., New York.
DIFFRACTION OF A PLANE SHOCKWAVE BY AN ARBITRARY RIGID CYLINDRICAL OBSTACLE, by M. B. Friedman and R. Shaw. Technical rept. no. 25 on Contract Nonr-266(08). Oct 60, 33p. 6 refs. CU-2-60-ONR-266(08)-CE; AD-249 141.

DESCRIPTORS: (*Shock waves, Diffraction) (*Cylindrical bodies, Pressure, *Wave transmission, Wave analysis, Distribution).

The two dimensional problem of the interaction of a plane weak shock wave with a cylindrical obstacle of arbitary cross section is considered. An integral equation for the surface values of the potential is formulated and solved approximately for the case of a square box with completely rigid boundaries. (Author)

PB 157 847 $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EFFECTS OF SUPERSONIC JETS IN A VACUUM, by George E. Owens. Mar 61, 13p. 17 refs. SB-61-13; AD-254 713.

DESCRIPTORS: *Supersonic flow, *Bibliography, *Exhaust gases, *Jets, Vacuum systems, Wake, Supersonic nozzles

These citations result from a limited search for information concerning the effects, far downstream, of a supersonic jet exhausting into a vacuum. Sources consulted include the catalog of the reports collection of LMSD's Technical Information Center, and the following indexes; Aeronautical Engineering Index; Index of NACA Technical Publications; and Science Abstracts, Section A - Physics. References listed in relevant reports were also included, if upon inspection they were found applicable to the search. Arrangement is alphabetical by main author, following the one bibliography which is included. The majority of the citations appeared in 1959. (Author)

PB 155 636 $2.60

National Research Labs., Ottawa (Canada).
EFFECT OF FLARE ON THE DYNAMIC AND STATIC MOMENT CHARACTERISTICS OF A HEMISPHERE-CYLINDER OSCILLATING IN PITCH AT MACH NUMBERS FROM 0.3 TO 2.0, by J. G. LaBerge. Jan 61, 25p. 1 ref. Aeronautical rept. LR-295; N. R. C no. 6195; AD-254 266.

DESCRIPTORS: *Aerodynamics, Airplane noses, *Aerodynamic configurations, Measurement, *Bodies of revolution, Mach number, Tails, Stability.

The dynamic and static moment characteristics of a cylindrical body of revolution with a hemisphere nose and various tail configurations were investigated at subsonic and supersonic speeds in the 30-inch wind tunnel. It was found that, for the axis of oscillation chosen for this investigation, and increasing flare angle at the model base improved the static stability but at the same time introduced a dynamic instability at transonic speeds. Thus, for this particular model and axis of oscillation, the proper selection of the flare angle appeared to be quite critical (between 9 degrees and 12 degrees). (Author)

AD-256 388 $3.60

National Research Labs., Ottawa (Canada)
WATER TUNNEL EXPERIMENTS ON A ZAP-FLAPPED SUCTION AEROFOIL, by R. H. Wickens, U. Okapuu, and R. R. Clifford. Dec 60, 38p. 4 refs. Aeronautical rept. LR-294; N. R. C. no. 6168.

DESCRIPTORS: *Boundary layer control, *Vertical take-off planes, *Wings, Hydrodynamics, Model tests, Aerodynamic configurations, *Flaps, Wake, Turbulent flow, Airfoils, Boundary layer, Canada, Water tunnels, *Aerodynamics.

Suction was used to control the circulation about a two-dimensional aerofoil with a Zap flap; the suction served to eliminate the turbulent wake behind the flap and provided a substantial increase in lift. Flow photographs were taken from which force data were inferred. The test facility was the N. A. E. flow visualization water tunnel. (Author)

PB 157 193 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
MEASUREMENTS OF STAGNATION POINT HEAT TRANSFER AT LOW REYNOLDS NUMBERS, by Antonio Ferri and Victor Zakkay. Interim rept. on Research on Aerodynamic Flow Fields, Contract AF 33(616)7661. Apr 61, 19p. 4 refs. PIBAL-644; ARL-38; AD-254 870.

DESCRIPTORS: *Heat transfer, Measurement, Aerodynamic heating, Gas flow, *Hypersonic flow, *Superaerodynamics, Spheres.

Measurements of stagnation point heat transfer are presented in the Reynolds number range between the free molecular flow and the range where modified boundary layer theory still applies. The measurements are compared with the analytical methods set forth by Ferri, Zakkay and Ting, (AD-242 704). The results show smooth transition between the two regions and indicate that the predicted Reynolds number for which the modified boundary layer theory can be used is in agreement with experiments. In the lower range of Reynolds number the ratio of q(w vort)/q(w vort equals 0) decreases and reaches a value of 1 at a Reynolds number of 40. (Author)

PB 155 393 $3.60

Polytechnic Inst. of Brooklyn, N. Y.
THICK BOUNDARY LAYERS OVER SLENDER BODIES WITH SOME EFFECTS OF HEAT TRANSFER, MASS TRANSFER, AND PRESSURE GRADIENT, by Martin H. Steiger and Martin H. Bloom. Rept. on Research on Aerodynamic Flow Fields, Contract AF 33(616)7661. Dec 60, 32p. 11 refs. ARL-6; AD-253 312.

DESCRIPTORS: *Aerodynamics, Fluid flow, *Boundary layer, Bodies of revolution, Gas flow, Heat transfer, Pressure, Compressible flow, *Axially symmetric flow, Integration, Mathematical analysis.

The integral method is employed to investigate some effects of compressibility, heat transfer, mass transfer, and streamwise pressure gradient in boundary layers over slender bodies of revolution, where the boundary layer thickness is not necessarily small compared to the body radius. The results for zero pressure gradient without mass transfer are compared with those of other investigators in the low-speed case and in the adiabatic-surface case. These flows generally produce nonsimilar profiles. A special case of zero pressure gradient with mass transfer, which yields a similar solution, is solved. For flows with and without pressure gradients and mass transfer, special conditions which produce similar profiles are derived. For low-speed flow with no mass transfer but with pressure gradients, a set of nonsimilar solutions is presented. (Author)

PB 157 624 $3.60

Washington U., Seattle. Coll. of Engineering.
PLANE COUETTE FLOW WITH SLIP BY THE METHOD OF MOMENTS IN KINETIC THEORY, by Robert E. Street. Technical rept. on Contract Nonr-477(28). Oct 60, 36p. 10 refs. AD-248 696.

DESCRIPTORS: Differential equations, *Gas flow, *Fluid mechanics, Temperature, Cylindrical bodies, Integral equations, Mathematical analysis.

The moment equations of Ikenberry and Truesdell (J. Rat. Mech. and Anal., 5:1 Ipp. 1-54 II pp. 55-128, 1956) are solved for the steady state plane Couette flow with first order slip in the boundary conditions. The results are compared with Millikan's solution of the Navier-Stokes equations when both plates have the same temperature. The analytic form of the general solution is the same as Grad's solution of his 13 Moment equations. When the plates have different temperatures the application of the first order velocity slip and temperature jump at the plates is more difficult and the solution must be found by a numerical iteration. (Author)

METALLURGY

ANL-6116 $1.25

Argonne National Lab., Ill.
STRUCTURES AND PROPERTIES OF URANIUM-FISSIUM ALLOYS, by S. T. Zegler and M. V. Nevitt. Rept. on Contract W-31-109-eng-38. July 61, 52p.

NYO-2580 $2.60

Aeroprojects, Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. TASK 1: ULTRASONIC CHEMICAL PROCESSING. TASK 2: ULTRASONIC METAL AND CERAMIC POWDER PROCESSING. TASK 3: ULTRASONIC INSTRUMENTATION. Progress rept. no. 24, 1 Oct-31 Nov 60, on Contract AT(30-1)-1836. Dec 60, 26p.

PB 157 630 $14.50

Armour Research Foundation [Chicago, Ill.]
DETERMINATION OF PHYSICAL PROPERTIES OF NONFERROUS STRUCTURAL SHEET MATERIALS AT ELEVATED TEMPERATURES, by D. D. Doerr. Rept. on Development and Determination of Design Specification Data, Contract AF 33(038)8681. Dec 51, 215p. 6 refs. AF Technical rept. no. 6517, Part I.

DESCRIPTORS: *Sheets, Materials, *Aluminum, *Magnesium, *Alloys, *Titanium, Physical properties, Preparation, Test equipment, Test methods, Temperature.

The compressive, bearing and shear properties have been determined for (1) 24S-T3 aluminum alloy at room temperature and at elevated temperatures between 212 and 700° F, with exposure periods ranging from 0.5 to 1000 hr; (2) 75S-T6 aluminum alloy, FS-1H and MH magnesium alloys at room temperature and at elevated temperatures ranging from 300 to 600° F, for exposure periods of between 0.5 and 1000 hrs; (3) annealed and cold rolled titanium materials at room temperature and at several elevated temperatures between 400 to 1000° F for exposure periods of 0.5 and 100 hr. These properties have been compared with the tensile data in an attempt to establish a possible correlation of the compressive, bearing, and shear characteristics with the tensile properties of the individual material at elevated temperatures.

PB 171 800 $1.00

Battelle Memorial Inst., Columbus, Ohio.
A DISCUSSION OF THEORIES OF GRAIN-BOUNDARY DIFFUSION, by C. C. Maneri and F. J. Milford. Rept. on Solid State Research and Properties of Matter, Contract AF 33(616)6265. July 61, 40p. 8 refs. ARL 48.

NAA-SR-4893 $1.75

Atomics International, Canoga Park, Calif.
IRRADIATION SWELLING OF URANIUM AND URANIUM ALLOYS, by G. G. Bentle. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 71p.

DESCRIPTORS: *Metallic crystals, Grains (Metallurgy), *Diffusion, Theory, Numerical analysis, Crystals

The major theoretical efforts dealing with grain-boundary diffusion have been reconsidered with a view to establishing their mathematical rigor and laying a firm foundation for further work. The details of Whipple's solution to the boundary value problem have been reconstructed and are given in this report. Fisher's approximate solution and its relationship to the exact solution have been considered. A way of evaluating the accuracy of this approximation has been outlined. The work of Borisov et al., has been shown to be equivalent to that of Whipple. Finally, an outline is presented of computational problems directed toward improving our understanding of the relationship of grain-boundary diffusion to the usual model and evaluating various approximations which are frequently used in the study of grain-boundary diffusion. (Author)

BMI-1545 $0.50

Battelle Memorial Inst., Columbus, Ohio.
PRELIMINARY STUDIES OF BONDING OF BERYLLIUM-CLAD UO_2 FUEL ELEMENTS, by Stan J. Paprocki, Edwin S. Hodge, and James S. Perrin. Rept. on Contract W-7405-eng-92. Sep 61, 21p.

PB 171 801 $0.50

Battelle Memorial Inst., Columbus, Ohio.
STUDIES OF GRAIN-BOUNDARY DIFFUSION BY ELECTRON-PROBE MICROANALYSIS, by A. E. Austin, N. A. Richard, and C. M. Schwartz. Final rept. 1 Mar 59-15 Mar 61, on Solid State Research and Properties of Matter, Contract AF 33(616)6265. July 61, 17p. 17 refs. ARL 49.

DESCRIPTORS: Copper, Zinc, *Metallic crystals, Nickel, Gold, *Diffusion, Lattices, Penetration, Grains (Metallurgy), Electron microscopy, Microanalysis, Crystals.

The diffusion of nickel into grain boundaries of various tilt angles in copper bicrystals was studied. The concentration contours from the grain boundary and the lateral-lattice diffusion were measured by means of electron-probe microanalysis. The products of grain-boundary width and diffusion coefficient were calculated and comparisons were made with theoretical solutions. The grain-boundary coefficient is concentration dependent above 3 per cent nickel in a 45-deg tilt boundary. With lower tilt angles, the coefficient is concentration dependent above 0.5 per cent nickel. (Author)

TID-12712 $0.75

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
FUNDAMENTALS OF SINTERING - V, by J. Brett and L. Seigle. Annual progress rept. no. 5, 1 July 59-30 June 60, on Contract AT(30-1)-2102. Apr 61, 31p.

HW-68910 $2.60

Hanford Atomic Products Operation, Richland, Wash.
SLIP CASTING OF MAGNESIA-TITANIA BODIES, by R. S. Rosenfels. Mar 61, 24p.

TID-13592 $6.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
RECRYSTALLIZATION AND SINTERING OF OXIDES. Progress rept. 1 Sep 60-31 Aug 61, on Contract AT(11-1)-82. Sep 61, 68p.

AD-255 253 repriced $5.00

Ladish Co., Cudahy, Wis.
FORGING PROGRAM TO IMPROVE MECHANICAL PROPERTIES OF LARGE STEEL FORGINGS, by E. H. Nimmer. Final technical engineering rept. 15 Sep 58-23 May 60, on Improve Mechanical Properties of Hi-Strength Steels, Contract AF 33(600)38060. Dec 60, 340p. 8 refs. AMC Technical rept. 60-7-755.

DESCRIPTORS: (*Steel, Forging, Mechanical properties, Heat treatment, Tests, Statistical analysis, Hardenability, Tensile properties) (Aircraft, *Landing gears, Materials)

Statistical analysis of 5,000 test data from nine forgings of AISI 4340 aircraft quality steel for a landing gear component shows that transverse ductility and toughness decrease (1) as a function of distance from surface to center of the ingot, (2) as a function of the hardenability of the particular ingot heat studied, and (3) as a function of the amount of reduction in cross-section when forging the ingot beyond a four to one reduction up to an eight to one reduction. Transverse properties are more affected than longitudinal properties and the effects are more pronounced as the strength level increases in the range to 200,000 - 300,000 psi. (Author)

PB 181 043 $0.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
PYROPHOSPHATE PLATING SOLUTIONS. AN ANNOTATED BIBLIOGRAPHY, by Robert C. Gex. Mar 61, 24p. 59 refs. Special bibliography SB-61-8; AD-254 843.

DESCRIPTORS: (*Bibliography, Coatings, *Phosphate coatings, Metal coatings, Copper, Brass, Magnesium, Cobalt, Iron , Lead, Zinc, Steel, *Electroplating solutions, Solutions), Electroplating, Electrodeposition, Electrolytes, Corrosion inhibition.

The literature was searched for articles on pyrophosphate solutions used in metal plating. The pyrophosphate solution contains the pyrophosphate radical (P207) and a bivalent metal usually sodium or potassium. References were found in the literature to the use of these solutions for plating primarily copper but also brass, cobalt, iron, lead, magnesium, nickel, steel and zinc. The arrangement is alphabetically by author with an index by metal and solution. (Author)

PB 152 495 $1.60

Naval Research Lab., Washington, D. C.
ISOTHERMAL STUDY OF CONCENTRATION AND TRANSPORT OF RADIOACTIVE STAINLESS STEEL COMPONENTS IN LIQUID LITHIUM, by W. N. Crofford, T. A. Kovacina, and R. R. Miller. 29 Dec 60, 12p. 7 refs. NRL rept. 5572; AD-251 452.

DESCRIPTORS: Containers, *Stainless steel, Alkali metals, *Lithium, *Liquid metals, *Sodium, Solvent action, Electrodeposition, Electrochemistry, Radiochemistry, Solubility, Temperature, Thermodynamics, Determination.

Relative to the use of liquid alkali metals for heat transfer media, a study has been made of the reaction of lithium metal with stainless steel container material. Isothermal mass transfer and equilibrium concentrations of the components of 347 stainless steel in lithium have been determined at 425, 625, and 825 C. The concentrations of components have been determined by counting the disintegration of radioactive isotopes of the components. Comparisons have been made between the lithium data obtained and available sodium data (Author)

PB 158 553 $2.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FATIGUE PROPERTIES OF ULTRAHIGH-STRENGTH STEELS, by C. M. Carman. June 60, 24p. 4 refs. Technical rept. R-1562. AD-242 925.

DESCRIPTORS: *Steel, Silicon, Copper, Tensile properties, Mechanical properties, Fatigue (Mechanics), (Recoilles rifles)

The rotating beam fatigue properties of 18 ultrahigh-strength low-alloy steels were investigated. The results were interpreted in terms of tempering temperature, composition, and fatigue strength-tensile or yield strength ratio. It is concluded that: (1) For steels with less than 0.4 percent silicon, the maximum fatigue strength was generally obtained at the lowest tempering temperature used, either 350° or 400°F. The fatigue strength of high-silicon steels remained approximately constant for tempering temperatures up to 600°F. (2) All of the steels containing 1.3 percent copper showed higher maximum fatigue strengths than the other steels when all were tempered at 400°F or lower. (3) For steels of similar alloy content, there is a decrease in the fatigue strength-tensile strength ratio with increasing carbon content. (4) Subsurface nucleation of fatigue cracks was prevalent in steels with the best fatigue properties. (5) The fatigue strength-yield strength ratio is greater for steels containing copper as a major constituent. It is recommended that: (1) The factors which contribute to the high fatigue strength of copper bearing steels be investigated more fully for application to non-copper bearing steels having greater ductility, and (2) efforts be made to improve the ductility of copper bearing steels. (Author)

PWAC-354 $1.00

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FUNDAMENTAL STUDY OF CREEP-RUPTURE UNDER COMBINED STRESS. Rept. on Contract AT(11-1)-229. June 61, 40p.

SCTM-215-61(11) $0.50

Sandia Corp., Albuquerque, N. Mex.
METALLURGICAL PHENOMENA ASSOCIATED WITH ACTIVE METAL BONDING, by F. W. Clinard. Oct 61, 20p.

PB 181 042 $0.50

Williams, Clyde and Co., Columbus, Ohio.
CELLULAR METAL. AN INTRIGUING MATERIALS CONCEPT. Rept. on Contract CC 4569. [1961] 22p. 20 refs.

DESCRIPTORS: (*Porous metals, History, Production, Physical properties, Mechanical properties), *Foamed metals.

A cellular metal may or may not be a foamed material; voids can be produced by other methods, such as by leaching away dispersed solid particles. This report discusses the historical development, methods of production, and characteristics and potential applications of such materials.

Structural Metallurgy and Corrosion

ANL-6370 $1.00

Argonne National Lab., Ill.
CORROSION STUDIES OF TERNARY ZIRCONIUM ALLOYS IN HIGH-TEMPERATURE WATER AND STEAM, by R. D. Misch and C. Van Drunen. Rept. on Contract W-31-109-eng-38, July 61, 37p.

PB 157 931 $1.60

[Materials Research Lab.] U. of California, Berkeley.
THE EFFECT OF DECREASES IN STRESS ON THE CREEP BEHAVIOR OF POLYCRYSTALLINE ALUMINUM IN THE DISLOCATION CLIMB REGION, by L. Raymond, W. Ludemann and others. Rept. for Mar 59-31 Mar 60 on Solid State Research and Properties of Matter, Contract AF 33(616)3860. May 60, 18p. 6 refs. WADD Technical rept. 60-326; AD-245 309.

DESCRIPTORS: *Creep, Aluminum, Crystals, Stresses, *Metallic crystals, Crystal structure, Deformation.

The effect of stress on the creep rate in the dislocation climb region was isolated from the effect of substructural changes by determining the effect of decreasing the stress at fixed creep strains on the subsequent course of creep. Two substructures, one produced by precreeping at 1300 psi to a strain early in the primary stage and another produced by precreeping to the secondary stage at the same stress, were studied. It was found that the effect of stress on the creep rate was a function of the substructure; the creep rate increases less rapidly with stress for the substructure present at the secondary creep stage which contains more closely spaced barriers to dislocation motion. Whereas the barriers to slip are introduced during the primary stage of creep in the dislocation climb region, these barriers are thermally recoverable. The secondary stage of creep is reached when the rate of introduction of new barriers equals the rate of removal of existing barriers as a result of recovery. Due to recovery of barriers the same secondary creep rate is eventually obtained for a given final stress regardless of the preceding creep history. (Author)

ORNL-TM-2 $1.10

Oak Ridge National Lab., Tenn.
THE EFFECT OF STRONG OXIDANTS ON CORROSION OF NICKEL ALLOYS BY FLUORIDE MELTS, by F. F. B. Blankenship. Sep 61, 3p.
This document was originally CF-60-3-125.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

PB 152 919 $5.60

Aeronautical Research Lab., Air Force Research Div., Wright-Patterson AFB, Ohio.
RANGE STRAGGLING OF PROTONS, ALPHA PARTICLES, CARBON^{12} AND OXYGEN^{16} IONS, by D. R. Locker. Rept. on Research in Nuclear Phenomena. Dec 60, 51p. 20 refs. ARL Technical note 60-134; AD-253 173.

DESCRIPTORS: *Protons, *Alpha particles, Carbon, Oxygen, *Ions, Acceleration, *Cyclotrons, Pair production, Measurement.

An analysis is presented of the range distribution of protons, alpha particle, C-12, and O-16 ions accelerated to about 10.4 Mev per nucleon in the University of Washington 60-inch cyclotron. The proton measurements are unique in that ionized molecular hydrogen was accelerated, resulting in proton pairs of equal energies, which enhances the straggling study. The alpha particles and C-12 ions were accelerated simultaneously, providing a point of range-energy comparison for a light and a medium mass nucleus. An approximate calculation has been made of the coulomb nuclear straggling in the C-12 and O-16 ranges, using an adaption of a method suggested by Bohr (1948) in his treatise on stopping processes. (Author)

NAS-NS-3039 $0.75

Argonne National Lab., Ill.
THE RADIOCHEMISTRY OF NIOBIUM AND TANTALUM, by Ellis P. Steinberg. Aug 61, 62p.

AD-256 908 $5.60

Armour Research Foundation, Chicago, Ill.
RADIATION EFFECTS ON ORGANIC SYSTEMS, by Paul Y. Feng. Final technical rept. 16 Sep 56-15 Jan 61, on Contract AF 18(603)121. 13 Apr 61, 52p. 48 refs. ARF 1093-16; S49-638; AFOSR rept. no. 555.

DESCRIPTORS: (*Organic compounds, *Fluorocarbons, Polycyclic compounds, Monocyclic compounds, Plastics, Resins, Gases, Halides, Benzenes, Ethylenes, Metal-organic compounds, Polymers, Radiation damage, *Radiochemistry), Energy, Excitation, Electrons, Gamma rays, Chromatographic analysis, (*Organic halides, Fluorination, Synthesis, Chemical reactions).

Included in the report are:
Radiolysis of CF_4-C_6H_6 systems, pub. in the Jnl. of Chemical Physics 28:507-508, Mar 58
The radiation chemistry of fluorinated organic compounds, reprint from 2nd UN Geneva Conference, P/922:166-170, 1958
The nature of the primary processes in electron and gamma irradiated systems (AFOSR-241)
A split-temperature column system for gas chromatographic analyses, pub. in Nature 188:311-312, 22 Oct 60.

NAA-SR-Memo-6545 $10.50

Atomics International, Canoga Park, Calif.
FAST NEUTRON CROSS SECTION AND ANGULAR DISTRIBUTION DATA APPLICABLE TO MONTE CARLO CALCULATION, by H. Alter. June 61, 133p.

NAS-NS-3040 $1.75

Bell Telephone Labs., Murray Hill, N. J.
THE RADIOCHEMISTRY OF LEAD, by W. M. Gibson. Aug 61, 164p.

PB 158 064 $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
LONG-RANGE SPIN-SPIN COUPLINGS IN SATURATED MOLECULES, by Donald R. Davis, Raymond P. Lutz, and John D. Roberts. Technical rept. no. 10 on Contract Nonr-220(26). 15 Nov 60, 6p. 4 refs. AD-246 514.

DESCRIPTORS: (Hydrogen, Fluorine, *Protons, *Nuclear spins, Spectrographic analysis), *Proton reactions, *Nuclear magnetic resonance, Spin.

Four examples of H-H and H-F spin-spin couplings that involve more than three consecutive single bonds are reported. Each of these systems is characterized by having either fixed or at least reasonably favored geometrical conformations.

PB 158 552-1 $11.00

General Electric Co. [Cincinnati, Ohio].
RADIATION EFFECTS SYMPOSIUM [NO. 4] 15-16 SEPTEMBER 1959 SPONSORED BY AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE. GENERAL SESSION PAPERS, VOLUME I. [1959] 150p. 46 refs. AD-245 446.

DESCRIPTORS: (Radio equipment, Magnetic alloys, Insulating materials, Electronic equipment, *Radiation damage) (*Data processing systems, Digital computers, Computers, Programming) (*Electromagnetic waves, Propagation, Attenuation) Symposia.

Contents:
Reactor irradiation of AN/ARC-34
Nuclear irradiation effects of magnetic alloys
Induced conductivity in pre-irradiated insulating materials
Attenuation of electromagnetic energy through the ionized cloud surrounding an airborne reactor
A data acquisition system for the study of transient radiation effects on electronic devices
(REMAS) A 704 computer program for handling radiation effects information.

HW-66066 $1.10

Hanford Atomic Products Operation, Richland, Wash.
A NOTE ON THE ULTIMATE CONTRACTION OF GRAPHITE, by D. R. de Halas. July 60, 5p.

HW-SA-2202 $1.60

Hanford Atomic Products Operation, Richland, Wash.
STUDIES OF SURFACE SORPTION IN GAS-GRAPHITE SYSTEMS, by R. C. Giberson. July 61, 11p.

TID-13065 $5.60

Johnston, William H., Labs., Inc., Baltimore, Md.
BASIC RADIATION STUDIES. Quarterly progress rept. Nov 60-Apr 61, on Contract AT(11-1)-650, Sec. 8. 53p.

AD-256 474 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
SPIN AND PARITY ANALYSIS FROM PRODUCTION AND DECAY OF HYPERON RESONANT STATES, by R. Gatto and H. P. Stapp. Rept. on Contracts AF 49(638)327 and Nonr-222(60). [1960] 9p. 10 refs. AFOSR-244.

DESCRIPTORS: Nuclear resonance, Mesons, *Hyperons, Pions, *Nuclear spins, *Parity, Radioactive decay, Analysis, Spin

Evidence for a pion-hyperon resonant state with a mass of about 1.37 BeV was reported recently. Methods are discussed for determining from angular correlations in the production and decay of this resonant state, which we call Y^*, its spin, Σ, and Y, and K.

LA-2463 $10.10

Los Alamos Scientific Lab., N. Mex.
RADIATION EFFECTS ON LITHIUM HYDRIDE, by Frank E. Pretzel, Dwayne T. Vier and others. Aug 61, 123p.

PB 157 706 $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
SUMMARY OF METHODS FOR DECONTAMINATING AND PROTECTING CONCRETE, by R. H. Heiskell. 18 Sep 58, 27p. 17 refs. Research and development technical rept. USNRDL-TR-257; AD-234 358.

DESCRIPTORS: *Concrete, *Radiological contamination, Countermeasures, Cleaning.

Ionic contaminant penetrates beneath the surface of bare concrete and surface removal methods are required to obtain more than 90-% removal of contaminant. Dry and slurry contaminants are effectively removed by liquid cleaning methods and dry contaminants can be removed by vacuum pick-up. Protective coatings minimize the problem of removing ionic contaminant from concrete and increase the effectiveness of liquid cleaning methods in removing both dry and slurry contaminants. (Author)

PB 153 896 $1.60

Naval Research Lab., Washington, D. C.
DETERMINATION OF THE J-VALUES OF S-TYPE NEUTRON RESONANCES BY MULTIPLE SCATTERING, by A. W. Sáenz and S. Podgor. 17 Feb 61, 14p. NRL rept. 5592; AD-252 972.

DESCRIPTORS: *Neutrons, Scattering, Polarization, Numerical methods and procedures, Resonance, *Neutron cross section, Nuclear resonance.

Selected results are presented of a Monte Carlo investigation of the multiple scattering of polarized and unpolarized neutrons by s-type resonances, for the case of polarized and unpolarized targets with plane-parallel slab geometry. The general objective was to investigate the feasibility of employing multiple resonant scattering measurements as a tool to determine the J-values of resonances of the above class. Results for the 337 ev, 132 ev, and 290 ev resonances of Mn55, Co59, and Ga71, respectively, strongly suggest the conclusion that data from such measurements can be employed to determine, in principle, these J-values for a number of resonances for which gamma width and total width are moderately well-known and satisfy the conditions specified above. The most interesting results concern unpolarized neutrons incident on unpolarized targets. (Author)

CF-61-9-31 $1.60

Oak Ridge National Lab., Tenn.
CESIUM EXCHANGE BY VERMICULITE, by D. G. Jacobs. Sep 61, 13p.

CF-61-1-75 $8.60

Oak Ridge National Lab., Tenn.
TECHNICAL FUNCTION AND OPERATION OF THE HIGH RADIATION LEVEL EXAMINATION LABORATORY, BUILDING 3525. Jan 61, 98p.

TID-13650 $2.60

Ohio State U. Research Foundation, Columbus.
NEW TRACER TECHNIQUES FOR EVALUATING THE EFFECTS OF AN INSECTICIDE ON THE ECOLOGY OF A FOREST FAUNA, by Tony J. Peterle and Robert H. Giles, Jr. Technical progress rept. 1 Dec 60-31 Aug 61, on Contract AT(11-1)-967. 23p. OSURF-1207-1.

PB 158 106 $9.10

Pennsylvania U., Philadelphia.
HIGH DENSITY EXPANSION FOR THE ISING MODEL WITH ARBITRARY SPIN AND RANGE OF INTERACTION, by Gerald Horwitz and Herbert Callen. Technical rept. no. 3 on Contract Nonr-551(36). Nov 60, 109p. 20 refs. AD-251 533.

DESCRIPTORS: *Molecular structure, Phase transitions, Mechanics, Statistical processes, Spin, Ferromagnetism, *Lattices.

A diagrammatic expansion is given for the free energy of a three-dimensional Ising model of arbitrary spin and range of interaction. By appropriate renormalization of the vertices of the diagrams this expansion is restricted to linked irreducible diagrams (diagrams having no articulation points). By a modification of a criterion, the renormalized rather than the original unrenormalized diagrams are classified in powers of $1/z$ (z measuring the number of ions within the effective range of interaction of any given ion). The free energy is computed to first order in $1/z$. For the special cases of simple cubic, body-centered

cubic and face-centered cubic lattics with nearest neighbor interactions, and spin 1/z, the Curie temperature is evaluated numerically. To first order in 1/z for these cases, the specific heat is continuous with an infinite slope on the low temperature side and a finite slope on the high temperature side; these quantitative results are in close agreement with the spherical model. (Author)

NYO-9516 $1.60

Technical Research Group, Syosset, N. Y.
SYNTHESIS OF SEMICONDUCTOR MATERIALS BY RADIATION INDUCED REACTIONS, by Kalman Held and Richard Goldman. Quarterly status rept. no. 8, 1 Feb-30 Apr 61, on Contract AT(30-1)-2392. [1961] 13p. TRG-132.

Instruments and Installations

HW-SA-2203 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SPECIFICATIONS, THERMOCOUPLES METAL SHEATHED, CORROSION RESISTANT, FOR NUCLEAR SERVICE, by Bert S. Kosut. June 61, 17p.

NDA-2131-34 $2.60

Nuclear Development Corp. of America, White Plains, N. Y.
CONCEPTUAL DESIGN OF A VAPOR VOLUME FRACTION INSTRUMENT, by M. H. Kalos, S. A. Davis and others. Rept. on Contract AT(30-1)-2303(IX). Apr 61, 33p.

DPST-57-111 $2.60

Savannah River Lab., Aiken, S. C.
CALIBRATION OF MINIATURE FISSION CHAMBERS FOR MEASURING FAST AND SLOW NEUTRON FLUX, by J. L. Hyde. Jan 57, 22p.

Nuclear Engineering and Power

IDO-28573 $2.75

Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. Semiannual progress rept. 1 Jan-30 June 61, on Contract AT(10-1)-880. Aug 61, 159p.

IDO-28506(Add. II) $5.60

Aerojet-General Nucleonics, San Ramon, Calif.
GAS-COOLED REACTOR EXPERIMENT-I. HAZARDS SUMMARY REPORT. [1961] 45p.

IDO-28506(Add. III) $1.10

Aerojet-General Nucleonics, San Ramon, Calif.
GAS-COOLED REACTOR EXPERIMENT-I, HAZARDS SUMMARY REPORT. May 60, 4p.

AD-261 324 repriced $3.50

Aerojet-General Nucleonics, San Ramon, Calif.
NUCLEAR HYDRAZINE PROGRAM, by J. H. Cusack, R. I. Miller, and H. P. Yockey. Final technical engineering rept. 22 Mar 60-22 Mar 61, on Contract AF 33(600)40878. July 61, 212p. 31 refs. ASD Technical rept. 61-7-840.

DESCRIPTORS: Research reactors, Production reactors, (*Hydrazines, Production, Costs), (Ammonia, Uranium compounds, Dioxides, Chemical reactions, Nuclear energy, Fission products, Neutron bombardment), Synthesis.

A new process is presented for accomplishing chemical reactions utilizing energy from a nuclear reactor in the form of fission fragment irradiation from suspended fissile materials. The production of hydrazine from liquid ammonia was selected as a desirable demonstration of the fission fragment irradiation. Fully enriched uranium in the form of micron size uranium dioxide particles was suspended in liquid ammonia and exposed to a neutron flux in the Livermore Pool Type Nuclear Reactor. The resulting hydrazine yield indicated this process is within the range of economic interest. Preliminary production plant design and estimated capital and operating costs are presented based on this experimental yield. These preliminary estimates indicate that a 175 Mw(t) nuclear reactor would produce 52.5 million lb of anhydrous hydrazine per year at an amortized production cost of about 25 cents per pound. (Author)

ANL-6354 $2.00

Argonne National Lab., Ill.
A MECHANISM EXPLAINING THE INSTABILITY OF EBR-I, MARK III, by R. R. Smith, R. G. Matlock and others. Rept. on Contract W-31-109-eng-38. Sep 61, 95p.

ANL-6385 $2.75

Argonne National Lab., Ill.
POWER-TO-VOID TRANSFER FUNCTIONS, by Helge Christensen. Rept. on Contract W-31-109-eng-38. July 61, 149p.

ANL-6433 $1.75

Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. Sep 61, on Contract W-31-109-eng-38. Oct 61, 66p.

ANL-6334 $2.00

Argonne National Lab., Ill.
STUDIES OF FAST REACTOR FUEL ELEMENT BEHAVIOR UNDER TRANSIENT HEATING TO FAILURE. I. INITIAL EXPERIMENTS ON METALLIC SAMPLES IN THE ABSENCE OF COOLANT, by C. E. Dickerman, E. S. Sowa and others. Rept. on Contract W-31-109-eng-38. Aug 61, 96p.

ANL-6395 $1.75

Argonne National Lab., Ill.
U.S. PARTICIPATION IN THE OEEC HALDEN REACTOR PROJECT, MAY 1959-SEPTEMBER 1960, by Leonard W. Fromm, Jr. Rept. on Contract W-31-109-eng-38. Dec 60, 68p.

NAA-SR-6370 $6.00

Atomics International, Canoga Park, Calif.
AEC UNCLASSIFIED PROGRAMS. Annual technical progress rept. fiscal year 1961, on Contract AT(11-1)-GEN-8. Aug 61, 540p.

NAA-SR-Memo-3485 $1.60

Atomics International, Canoga Park, Calif.
CALCULATED THERMAL FLUX DISTRIBUTION IN AND AROUND SRE INPILE POISON RING TEST, by R. J. Doyas. Jan 59, 12p.

NAA-SR-6446 $1.00

Atomics International, Canoga Park, Calif.
EXPONENTIAL EXPERIMENTS WITH HEAVY-WATER, GRAPHITE-AND-DIPHENYL MODERATED, URANIUM METAL LATTICES, by R. W. Campbell and C. H. Skeen. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 37p.

NAA-SR-Memo-6171 $1.60

Atomics International, Canoga Park, Calif.
SPRING-MASS-DAMPED SYSTEM EXPONENTIAL RESPONSE, by R. N. Cordy. Aug 61, 15p.

NAA-SR-Memo-3116 $1.10

Atomics International, Canoga Park, Calif.
TEMPERATURE DEPENDENCE OF THE THERMAL NEUTRON FLUX DISTRIBUTION FOR A SQUARE URANIUM GRAPHITE LATTICE, by C. H. Skeen. Sep 58, 5p.

NAA-SR-Memo-6512 $2.60

Atomics International, Canoga Park, Calif.
URANIUM CARBIDE, by M. Bloomfield. June 61, 29p.

BNL-671(S-58) $1.75

Brookhaven National Lab., Upton, N. Y.
NUCLEAR ENGINEERING DEPARTMENT. Progress rept. 1 Jan-30 Apr 61. 72p.

DP-645 $0.75

du Pont de Nemours, E. I., and Co., Wilmington, Del.
HEAVY WATER MODERATED POWER REACTORS. Progress rept. on Contract AT(07-2)-1. Sep 61, 27p.

DLCS-1480115 $2.60

Duquesne Light Co., Shippingport, Pa.
CORE I CONTROL ROD DRIVE MECHANISM PERIODIC TEST, CORE I, SEED 2. 27p.

PB 158 552-2 $13.00

General Electric Co. [Cincinnati, Ohio].
RADIATION EFFECTS SYMPOSIUM [NO. 4] 15-16 SEPTEMBER 1959 SPONSORED BY AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE. GENERAL SESSION PAPERS, VOLUME II. [1959] 190p. 30 refs. AD-245 447.

DESCRIPTORS: (Neutron flux density, Elastomers, Hydraulic systems, Phenyl radicals, Ethers, Ammonium radicals, Perchlorates, *Radiation damage, X-rays, Gamma rays, Electrons) Symposia.

Contents:
A method for the analysis of activation foil data
Neutron-gamma flux mapping at the radiation effects facility
Radiation and other environmental effects on elastomeric compounds
Gamma irradiation of electro-hydraulic servo test loop using oronite 8515 fluid
Effects of electron radiation on the thermal properties of selected polyphenyl ethers
The effects of x-ray and gamma-ray irradiation on the thermal decomposition of ammonium perchlorate in the solid state.

PB 158 552-3 $13.50

General Electric Co. [Cincinnati, Ohio].
RADIATION EFFECTS SYMPOSIUM [NO. 4] 15-16 SEPTEMBER 1959 SPONSORED BY AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE. GENERAL SESSION PAPERS, VOLUME III. [1959] 192p. 48 refs. AD-245 448.

DESCRIPTORS: (Electronic equipment, Textiles, Leather, Aircraft tires, Elastomers, Constant speed drives, Hydraulic systems, *Radiation damage), (*Electronic equipment, Reliability).

Contents:
Long-term reliability achievement and demonstration for electronic equipments
Irradiation of fabrics and leather
Derivation of thermal neutron spectra from transmission data
Radiation effects of a 10-MW reactor on environs of AFF-67
Radiation resistant aircraft tires
Radiation resistant poly-siloxane elastomers
Irradiation of an aircraft hydraulic constant speed drive.

PB 158 552-4 $14.50

General Electric Co. [Cincinnati, Ohio].
RADIATION EFFECTS SYMPOSIUM [NO. 4] 15-16 SEPTEMBER 1959 SPONSORED BY AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE. GENERAL SESSION PAPERS, VOLUME IV. [1959] 217p. 74 refs. AD-245 449.

DESCRIPTORS: (Turbojet engines, Electronic equipment, Airborne, Fuel tanks, Seals, Metals, Organic materials, Sealing compounds, *Radiation damage), Corrosion, Design, Stresses, (*Nuclear propulsion, Test methods) Symposia.

Contents:
Gamma irradiation of X-211 engine accessory systems
Airborne electronic and nuclear powered vehicles
The influence of nuclear radiation on the corrosion of metals
Dynamic radiation effects testing methods
O-ring testing in mixed field irradiation
Designing for minimum activation
Combined effects of nuclear radiation and dynamic electronic mechanical stress fields in organic materials
Radiation effects - a major influence in designing electronic systems for use in nuclear powered aircraft
Radiation effects on aircraft pressure and fuel tank sealants.

GEAP-3655 $9.10

General Electric Co., San Jose, Calif.
PRESSURE DROP ALONG A FUEL CYCLE FUEL ASSEMBLY, VARIOUS ORIFICE CONFIGURATIONS, by E. Janssen and J. A. Kervinen. Rept. on Contract AT(04-3)-189, P. A. No. 11. May 61, 103p.

HW-67255 $1.25

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF CHLORINE INHIBITION OF GRAPHITE OXIDATION AS A GAS-COOLED REACTOR SAFEGUARD, by R. E. Dahl. Rept. on Contract AT(45-1)-1350. Apr 61, 46p.

TID-12747 $3.50

Kaiser, Henry J., Co., Oakland, Calif.
STEAM-COOLED POWER REACTOR EVALUATION, CAPITAL AND POWER GENERATIONS COSTS. Rept. on Contract AT(04-3)-334. Mar 61, 262p.

LAMS-2620 $0.50

Los Alamos Scientific Lab., N. Mex.
LAMPRE PROGRAM. Quarterly status rept. for period ending 20 Aug 61, on Contract W-7405-eng-36. Sep 61, 26p.

LA-2528 $7.60

Los Alamos Scientific Lab., N. Mex.
REMOTE INSTRUMENTATION SYSTEM FOR A NUCLEAR PROPULSION TEST REACTOR, by William J. Plummer. Rept. on Contract W-7405-eng-36. Apr 61, 75p.

MND-M-1819 $3.00

Martin Co., Baltimore, Md.
PM-1 NUCLEAR POWER PLANT PROGRAM, by J. S. Sieg. Quarterly progress rept. no. 8, 1 Dec 60-28 Feb 61, on Contract AT(30-1)-2345. Apr 61, 217p.

ORO-474 $1.60

National Carbon Co., Fostoria, Ohio.
FUEL CYCLE DEVELOPMENT PROGRAM. Monthly newsletter, June 61, on Contract AT(40-1)-2560. Sep 61, 17p.

NDA-2148-4 $2.00

Nuclear Development Corp. of America, White Plains, N. Y.
STEAM-COOLED POWER REACTOR EVALUATION, STEAM-COOLED FAST BREEDER REACTOR, by G. Sofer, R. Hankel and others. Rept. on Contract AT(30-1)-2303. Apr 61, 86p.

NUMEC-P-34 $1.10

Nuclear Materials and Equipment Corp., Apollo, Pa.
DEVELOPMENT OF PLUTONIUM BEARING FUEL MATERIALS. Monthly progress letter rept. Aug 61, on Contract AT(30-1)-2389. Sep 61, 5p.

CF-61-8-67 $1.60

Oak Ridge National Lab., Tenn.
GC-ORR LOOP NO. 2 CHECK VALVE TESTS. by F. A. Flint. Aug 61, 20p.

CF-61-7-92 $1.60

Oak Ridge National Lab., Tenn.
RING-JOINT SPRING-CLAMP DISCONNECT, by P. P. Holz. July 61, 17p.

TID-6613(Suppl. 1) $2.50

Office of Isotopes Development, Atomic Energy Commission, Washington, D. C.
RADIOISOTOPES IN WORLD INDUSTRY. Abstracts of selected foreign literature. June 61, 123p.

IDO-16705 $2.00

Phillips Petroleum Co., Idaho Falls.
ORGANIC COOLANT REACTOR PROGRAM. Quarterly rept. 1 Jan-31 Mar 61, on Contract AT(10-1)-205. July 61, 84p.

IDO-16716 $0.75

Phillips Petroleum Co., Idaho Falls.
SPERT PROJECT, ed. by F. Schroeder. Quarterly technical rept. Apr-June 61, on Contract AT(10-1)-205. Sep 61, 33p.

NYO-2506 $1.10

Radiation Applications, Inc., Long Island City, N. Y.
THE TECHNOLOGY AND APPLICATIONS OF LARGE FISSION PRODUCT BETA SOURCES. Quarterly rept. 1 Apr-30 June 61, on Contract AT(30-1)-2186. July 61, 7p.

TID-13067 $3.00

Sargent and Lundy, Chicago, Ill.
ENGINEERING EVALUATION STUDIES, HEAVY WATER MODERATED POWER REACTOR PLANTS. Quarterly progress rept. Jan-Mar 1961, on Contract AT(38-1)-213. Apr 61, 217p.

NDA-2147-7 $1.50

United Nuclear Corp., White Plains, N. Y.
STABILITY STUDIES ON FAST REACTORS WITH DELAYED REACTIVITY COEFFICIENTS, by J. Agresta. Rept. on Contract AT(30-1)-2303(XIII). Aug 61, 48p.

NDA-2147-8 $2.00

United Nuclear Corp., White Plains, N. Y.
STUDIES RELATED TO PREDICTING COOLANT BEHAVIOR FOR FAST REACTOR SAFETY, by R. P. Stein. Rept. on Contract AT(30-1)-2303(XIII). Aug 61, 74p.

WCAP-4043 $10.50

Westinghouse Electric Corp., Pittsburgh, Pa.
OPTIMIZATION OF A PRESSURE TUBE POWER REACTOR FUELED WITH NATURAL URANIUM AND USING HEAVY WATER AS MODERATOR, by Raymond G. St. Paul. Oct 60, 141p.

WAPD-PWR-TE-90 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
XENON TRANSIENT TEST. Rept. on Contract AT(11-1)-GEN-14. Oct 61, 11p.

Radioactivity

TID-13862 $1.60

Atomics International, Canoga Park, Calif.
ENVIRONMENTAL MONITORING REPORT. 1 Oct-31 Dec 60. 12p.

TID-13863 $1.60

Atomics International, Canoga Park, Calif.
ENVIRONMENTAL MONITORING REPORT. 1 Jan-31 Mar 61. 12p.

TID-13846 $1.10

California U., Los Angeles. School of Medicine.
BACKGROUND AND FALLOUT MONITORING PROGRAM, WEST LOS ANGELES, CALIFORNIA, by Louis B. Silverman and Evan M. Romney. Second and Third Quarter 1960 summary rept. on Contract AT(04-1)-GEN-12. 5p.

PB 181 066 $3.50

Defense Atomic Support Agency, Washington, D. C.
HIGH ALTITUDE SAMPLING PROGRAM (HASP), by Albert K. Stebbins, III. Special rept. no. 2. 1 Aug 61, 244p. 134 refs. DASA-539B.

DESCRIPTORS: *Atmosphere, Stratosphere, *Radioactivity, Aerosols, Particles, *Radioactive fall-out, Sampling, Hazards, Strontium, Tungsten, Natural radioactivity, Barium, Cerium, Rhodium, Plutonium, Carbon, Beryllium, Phosphorus, Lead, Radioactive isotopes

Contents:
Introduction
Calibration of U-2 ducts
Natural stratospheric dust
Synopsis of Phase V data
Strontium-90 and Tungsten-185 in the stratosphere
Barium-140, strontium-89, cerium-144, rhodium-102 and plutonium in the stratosphere
Natural radioactivity in the atmosphere

Fallout from teak and orange
Stratospheric mixing processes
Surface fallout
Biological hazard from fallout
Conclusions and future work

TID-13843 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ENVIRONMENTAL MONITORING. Annual rept. Jan-Dec 60, on Contract W-31-109-eng-52. Jan 61, 14p.

TID-13844 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ENVIRONMENTAL MONITORING. Quarterly rept. Jan-Mar 61, on Contract W-31-109-eng-52. Apr 61, 13p.

LAMS-2588 $2.50

Los Alamos Scientific Lab., N. Mex.
RADIATION MEASUREMENT OF THE EFFLUENT FROM THE KIWI-A SERIES OF REACTORS, by H. S. Jordan and K. H. Larson. Rept. on Contract W-7405-eng-36. Oct 61, 128p.

TID-13448 $1.10

National Lead Co., Cincinnati, Ohio.
FEED MATERIALS PRODUCTION CENTER ENVIRONMENTAL MONITORING. Quarterly rept. July-Sep 60, on Contract AT(30-1)-1156. Nov 60, 12p.

TID-13449 $1.60

National Lead Co., Cincinnati, Ohio.
FEED MATERIALS PRODUCTION CENTER ENVIRONMENTAL MONITORING. Quarterly rept. Oct-Dec 60, on Contract AT(30-1)-1156. Feb 61, 13p.

TID-13450 $1.60

National Lead Co., Cincinnati, Ohio.
FEED MATERIALS PRODUCTION CENTER ENVIRONMENTAL MONITORING. Quarterly rept. Jan-Mar 61, on Contract AT(30-1)-1156. Apr 61, 13p.

TID-13847 $1.60

National Lead Co., Cincinnati, Ohio.
FMPC ENVIRONMENTAL MONITORING. Annual rept. on Contract AT(30-1)-1156. May 60, 8p.

TID-13848 $1.10

National Lead Co., Cincinnati, Ohio.
FMPC ENVIRONMENTAL MONITORING. Quarterly rept. Jan-Mar 60, on Contract AT(30-1)-1156. May 60, 5p.

TID-13447 $1.10

National Lead Co., Cincinnati, Ohio.
FMPC ENVIRONMENTAL MONITORING. Quarterly rept. Apr-June 60, on Contract AT(30-1)-1156. Aug 60, 9p.

MTRL-54-62 $1.60

Phillips Petroleum Co., Idaho Falls.
PROCESS WATER FISSION PRODUCT ACTIVITY FROM MTR FUEL ASSEMBLIES, by D. R. deBois-blanc, C. F. Leyse and M. H. Bartz. July 54, declassified 12 July 61. 13p.

TID-13857 $1.10

Rocky Flats Plant, Denver, Colo.
ENVIRONMENTAL SURVEY - JULY-SEPTEMBER, 1960. Oct 60, 5p.

TID-13858 $1.10

Rocky Flats Plant, Denver, Colo.
ENVIRONMENTAL SURVEY - OCTOBER-DECEMBER, 1960. 9p.

SC-4628(M) $0.50

Sandia Corp., Albuquerque, N. Mex.
RADIOACTIVE ENVIRONMENTAL SURVEY AT SANDIA CORPORATION, by William D. Burnett, Donald J. Coleman and others. May 61, 33p.

TID-13853 $2.60

Savannah River Plant, Aiken, S. C.
THE EFFECT OF THE SAVANNAH RIVER PLANT ON ENVIRONMENTAL RADIOACTIVITY. Quarterly rept. Apr-June 60. 27p.

TID-13854 $2.60

Savannah River Plant, Aiken, S. C.
THE EFFECT OF THE SAVANNAH RIVER PLANT ON ENVIRONMENTAL RADIOACTIVITY. Quarterly rept. July-Sep 60. 25p.

TID-13855 $1.60

Savannah River Plant, Aiken, S. C.
THE EFFECT OF THE SAVANNAH RIVER PLANT ON ENVIRONMENTAL RADIOACTIVITY. Quarterly rept. Oct-Dec 60. Mar 60, 16p.

TID-13856 $1.60

Savannah River Plant, Aiken, S. C.
THE EFFECT OF THE SAVANNAH RIVER PLANT ON ENVIRONMENTAL RADIOACTIVITY. Quarterly rept. Jan-Mar 61. 16p.

Waste Disposal

NYO-4813 $5.60

Harvard U., Boston, Mass.
AIR CLEANING STUDIES, by Richard Dennis, Leslie Silverman and others. Progress rept. 1 July 58-30 June 59, on Contract AT(30-1)-841. Aug 61, 51p.

WIN-124 $0.75

National Lead Co., Inc., Winchester, Mass.
AEC RESEARCH AND DEVELOPMENT REPORT. Quarterly rept. 1 Jan-31 Mar 61, on Contract AT(49-6)-924. May 61, 40p.

WIN-125 $2.50

National Lead Co., Inc., Winchester, Mass.
AEC RESEARCH AND DEVELOPMENT REPORT. Summary rept. 1959-1961, Winchester Lab., Mass. and Grand Junction, Colo. Sep 61, 134p.

WIN-123 $0.50

National Lead Co., Inc., Winchester, Mass.
THE DETERMINATION OF ACTINIUM IN URANIUM MILL EFFLUENTS, by E. J. Baratta and M. H. Feldman. Rept. on Contract AT(49-6)-924. June 61, 17p.

ORNL-3105 $1.60

Oak Ridge National Lab., Tenn.
REDUCTION OF LIQUID RADIOACTIVE WASTES TO SOLIDS; SCOUTING TESTS, by C. W. Hancher. Rept. on Contract W-7405-eng-26. Aug 61, 15p.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

PB 157 917 $2.60

[Flight and Engineering Test Group, Wright Air Development Div.] Wright-Patterson AFB, Ohio.
DRAG CHARACTERISTICS OF PARACHUTES, by S. F. Hoerner. Oct 50, 21p. 17 refs. AF Technical rept. no. 6201.

DESCRIPTORS: *Parachutes, Drag, Aerodynamics, Parachute descents, Parachute fabrics, Permeability.

The drag of parachutes differs from that of other bodies in two respects. First, the cloth or material, the parachute is made of, is pervious, that is, penetrable to a certain extent, to the air streaming against it. Second, the flow pattern around the parachute canopy is usually not stable; the descent is accordingly oscillating and/or gliding. In the first part of this report the drag of pervious sheets is considered, as a function of their permeability. Then the drag of parachute-like bodies, kept in stationary position or oscillating respectively, is evaluated from experiments. Finally the mechanism and the aerodynamic forces of freely gliding parachutes are explained. (Author)

PB 156 462 $2.60

Quartermaster Field Evaluation Agency, Fort Lee, Va.
APPLICATION OF NON-DESTRUCTIVE TESTING TECHNIQUES TO FIELD TESTING OF MILITARY FOOTWEAR, by James C. Perkins, Jr. Apr 61, 28p. Technical rept. R-10; FEA MRS 58-7h; AD-254 743.

DESCRIPTORS: *Non destructive testing, *Shoes, Military equipment, *Fluoroscopes, Radiography, X-ray photography, X-rays.

Based on the results of a study conducted to determine the feasibility of the use of non-destructive inspection techniques to detect internal defects in military footwear under field use conditions, it is concluded that the mobile X-ray subsistence inspection van and the portable X-ray footwear inspection unit are both satisfactory for the fluoroscopic and radiographic inspection of footwear items. The quality control exercised by the manufacturers of military footwear is not adequate to insure consistent quality of construction in footwear obtained for test purposes. The frequency and nature of internal defects found in new and worn footwear items, and the possible effect of such defects upon other characteristics of footwear, warrants the non-destructive inspection of all footwear items, in addition to the standard visual inspection method, both before and after test wear. The types of internal defects which are most likely to affect the comfort or durability of footwear are unclinched nails in the sole or heel area and filler voids between the outsole components. Footwear with unclinched nails may be satisfactorily repaired prior to wear, thereby avoiding discomfort or injury to the foot of the wearer in the event that the unclinched nail penetrates the insole. (Author)

PHYSICS

PB 153 979 $1.10

Aeronautical Research Lab., Air Force Research Div., Wright-Patterson AFB, Ohio.
INTERNAL CONVERSION PROCESSES IN BIACETYL, by Jean T. Dubois. Rept. on Research on Combustion Kinetics. Jan 61, 8p. 7 refs. ARL-8; AD-254 106.

DESCRIPTORS: Gases, *Molecules, *Reaction kinetics, Atomic energy levels, Decomposition, *Photochemical reactions, Photolysis, Energy, Phosphorescence, Fluorescence, Mathematical analysis, Theory, *Acetyl radicals.

It is shown that for biacetyl molecules in the gas phase, the rate of interstate crossing I'A sub u (atomic energy level) yields T is independent of the vibrational energy content of I'A sub u state. On the other hand, the rate of internal conversion T yields A sub g (ground state) obeys the equation: i equals 6.5 x 10 to the 7th power exp(-7500/RT). (Author)

ISC-1177 $11.50

Ames Lab., Iowa [State U. of Science and Tech.]
STRUCTURE, MOLECULAR ORIENTATION AND MECHANICALLY INDUCED REORIENTATION OF MOLECULES IN MULTIMOLECULAR FILMS OF LONG-CHAIN n-HYDROCARBON DERIVATIVES, by Chester Louis Sutula and L. S. Bartell. May 59, 153p.

PB 157 412 $1.10

Brown U. Div. of Applied Mathematics, Providence, R. I.
NOTE ON AIRFOIL THEORY IN HYDROMAGNETICS by G. S. S. Ludford. Technical rept. no. 38 on Contract Nonr-562(07). Oct 60, 7p. 4 refs. Rept. no. 562(07)/38; AD-245 136

DESCRIPTORS: *Airfoils, Theory, *Magnetohydrodynamics, Mathematical analysis.

PB 157 417 $3.60

California U., Berkeley.
PARAMAGNETIC RESONANCE HYPERFINE STRUCTURE OF TETRAVALENT Pa^{231} IN Cs_2ZrCl_6, by J. D. Axe, H. J. Stapleton, and C. D. Jeffries. Technical rept. no. 5 on Contract Nonr-222(61). Oct 60, 33p. 14 refs. AD-245 699.

DESCRIPTORS: (*Protactinium, *Paramagnetic resonance, *Hyperfine structure, Single crystals, Crystals, Electrons, Magnetic moments).

Paramagnetic resonance absorption at 3 cm wavelengths is observed for tetravalent Pa^{231} in a single crystal of Cs_2ZrCl_6 at helium temperatures.

PB 153 881 $4.60

Diamond Ordnance Fuze Labs., Washington, D. C.
STRONG SHOCK WAVES IN "POLLED" BARIUM TITANATE CERAMIC ELEMENTS, by P. S. Brody. 20 Oct 60, 48p. 22 refs. Technical rept. TR-869; AD-248 127.

DESCRIPTORS: *Shock waves, Propagation, *Barium compounds, *Titanates, Ceramic materials, Temperature, Hydrodynamics, Thermodynamics, Dielectrics, *Impack shock, Projectiles, Pressure, Theory, Cylindrical bodies

A theory is developed for the time-dependent current output of an axially polled right cylinder of barium titanate ceramic which results when an axially directed plane shock wave propagates through the cylinder. Polling is a technique where the tetragonal domains are allowed to reform aligned and therefore producing an element with a net spontaneous or remanent polarization. The current output determined is that through a resistor connected between electrodes on the cylinder faces. An experimental method of producing shock pressures up to 120 kilobars in these ceramic elements by a projectile impact method is described. The ratio of the dielectric constants before and behind the shock front is inferred from comparisons of experiment and theory.

PB 157 368 $5.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
PRELIMINARY STUDY OF TWO PRINCIPLES FOR PRECISE PRESSURE INDICATION, by Robert W. Rasche. Rept. on Contract Nonr-1841(53). Sep 60, 51p. 12 refs. Rept. 8060-R-4; AD-250 892.

DESCRIPTORS: Velocity, Sea water, Sound, *Underwater sound, Measurement, Liquids, *Pressure gages, *Dielectric properties, *Depth indicators.

The problem of improved pressure measurement for depth sensing and other Naval applications is studied. A preliminary study was conducted of two techniques for precise pressure indication. Both techniques are characterized by measurement of a basic pressure-sensitive property, viz., the variation of the velocity of sound in liquid and the variation of dielectric constant of certain liquid dielectrics with pressure. Sea water pressure is transmitted to a suitable pressure-sensitive liquid and a velocity of sound or capacitance measurement made. Two methods of measuring the velocity of sound are analyzed for utilization as dynamic pressure indicators. (Author)

PB 157 364 $1.10

[Institute of Flight Structures] Columbia U., New York.
AN APPROXIMATION IN PROBLEMS OF VISCOELASTIC WAVE PROPAGATION, by H. H. Bleich and J. L. Sackman. Technical rept. no. 10 on Contract Nonr-266(34). Sep 60, 8p. 2 refs. CU-2-60-ONR-266(34)-CE; AD-246 725.

DESCRIPTORS: (*Solids, Stresses, *Wave transmission, Elasticity, Propagation), Structures.

PB 156 688 $1.10

Israel Inst. of Tech., Haifa.
COLLECTIVE MOTIONS IN A PLASMA DUE TO MAGNETIC INTERACTION, by G. Kalman. Technical note no. 1 on Contract AF 61(052)393. 10 Nov 60, 6p. 4 refs. ARL-42; AD-254 592.

DESCRIPTORS: (*Plasma physics, Particles, *Plasma oscillations, Magnetic fields, Ions, Numerical analysis, Electric fields, Motion.)

A summary is given on the results obtained for magnetic collective modes in a plasma in the random phase approximation. An oscillating and an exponentially increasing mode exist. The dispersion relation is given explicitly. (Author)

UCRL-8816 $1.50

Lawrence Radiation Lab., U. of California, Berkeley. LECTURES ON PHYSICS, BIOPHYSICS, AND CHEMISTRY FOR HIGH SCHOOL SCIENCE TEACHERS, ed. by Edward C. Calhoon and Paul W. Starring. Given at the Ernest O. Lawrence Radiation Laboratory, Berkeley, Calif., June-August 1959. 162p.

LAMS-2580 $1.50

Los Alamos Scientific Lab., N. Mex. A CALCULATION OF THE BETA ENERGY ABSORBED BY TRITIATED GASES IN SPHERICAL VESSELS, by Marvin M. Mueller. Rept. on Contract W-7405-eng-36. Oct 61, 59p.

LA-2613 $0.50

Los Alamos Scientific Lab., N. Mex. DETONATION PERFORMANCE CALCULATIONS USING THE KISTIAKOWSKY-WILSON EQUATION OF STATE, by Charles L. Mader. Rept. on Contract W-7405-eng-36. Oct 61, 20p.

TID-13191 $1.60

Mellon Inst. [of Industrial Research] Pittsburgh, Pa. PRECISION LATTICE PARAMETER DETERMINATION BY DOUBLE-SCANNING DIFFRACTOMETRY, by H. W. King and L. F. Vassamillet. July 61, 18p.

PB 153 580 $1.10

Naval Research Lab., Washington, D. C. PENETRATION OF ELECTROMAGNETIC WAVES INTO IONIZED GASES, by W. R. Faust. 7 Feb 61, 9p. 7 refs. NRL rept. 5590; AD-252 588.

DESCRIPTORS: *Gas ionization, *Electromagnetic waves, Plasma physics, Electric fields, Partial differential equations.

Extension is made of the work of Reuter and Sondheimer (Proc. Roy. Soc. London 195(A), 336, 1948) on the anomalous skin effect to the study of the penetration of electromagnetic waves into a semi-infinite plasma. Approximate expressions for the behavior of the electric field under various limiting conditions are derived for a Maxwell-Boltzmann distribution. (Author)

PB 158 510 $13.50

Norair Div., Northrop Corp., Hawthorne, Calif. MAGNETOGASDYNAMIC ACCELERATION OF FLOWING GASES AND APPLICATIONS, by Sterge T. Demetriades. 23 Mar 59, 194p. 83 refs. Rept. no. NB-59-153.

DESCRIPTORS: *Gas flow, Acceleration, Electromagnetic fields, Magnetohydrodynamics, Fluid dynamics, Gas ionization, Transport properties, Conductivity, Shock waves, Numerical analysis, Plasma physics.

The theory of steady, inviscid, one-dimensional flow of a perfect conducting gas in magnetic and electric fields is developed with special emphasis on the basic assumptions and the physical foundations of such flows. It is concluded that external electric and magnetic fields (acting along the z and y axes of a Cartesian coordinate system respectively) can accelerate a gas of high conductivity (0.1 to 100 mhos/cm) flowing along the x-axis to several times its initial velocity with moderate field strengths (ca 1000 gauss and 10 volts/cm). The properties of gases of interest in magnetogasdynamic flows are discussed with the emphasis on conductivity. The application of these principles to the Propulsive Fluid Accumulator (PROFAC) system for space flight is proposed and the design considerations, advantages and disadvantages are given.

PB 158 498 $5.60

Republic Aviation Corp. [Farmingdale, N. Y.] CYCLOTRON RADIATION FROM A MAGNETIZED ELECTRON GAS IN THERMAL EQUILIBRIUM, by H. Rosner. Rept. on Contract AF 29(601)1218. Sep 59, 56p. 5 refs. Rept. no. MSD 206-954; AFSWC-TR-59-63; AD-236 698.

DESCRIPTORS: (Magnetic fields, *Plasma physics, *Plasma oscillations, Electrons) (Vector analysis).

The radiation intensity per unit volume of nonrelativistic electron gas in thermal equilibrium is investigated in the presence of a magnetic field. The derivation is carried out by means of two conceptually different processes. Expressions are obtained for the rate of radiation loss per unit volume. The spectral properties of the nonrelativistic radiation are then investigated, with the result that only the first spectral component is signficant. In conclusion, the radiative contributions of mixed-in relativistic electrons of a given mean energy are examined for both total and spectral intensities. The radiation of these relativistic electrons is shown to be principally in directions transverse to the magnetic fields. (Author)

PB 154 244 $3.60

Southern Research Inst., Birmingham, Ala. DEVELOPMENT OF A CONSTANT INFRARED SOURCE. Final technical rept. 10 Feb 59-31 Aug 60, on Contract AF 08(635)168. 31 Aug 60, 31p. 4 refs. Rept. no. 4581-1063-XVIII; APGC-TR-60-58; AD-249 518.

DESCRIPTORS: Infrared lamps, Sources, *Infrared radiation, Targets, Aerial targets, Infrared equipment.

An electrically powered infrared source was developed for augmenting towed aerial targets. Radiance in the 1.8-2.8 micron wavelengths is 300-450 w/steradian within a 40 deg cone. Power consumption is nominally 1400 w at 48.5 v. The complete source weighs 8.5 lbs. Ten sources and two spares were delivered for operational testing. A prototype has successfully operated at -65 deg F and 35,000 ft of simulated altitude for over 1 hr, including 10 off-on cycles. The source consists of a 5/8-in.-diam Globar in an aluminum reflector protected by a Pyrex window. The source could be adapted for use in the 3-5 micron band by increasing the Globar surface area and eliminating the window. (Author)

Electronics

PB 158 122 $6.60

Armour Research Foundation, Chicago, Ill.
EXCESS NOISE IN SEMICONDUCTORS, by James J. Brophy. Annual summary rept. no. 5, 15 Nov 59-14 Nov 60, on Contract Nonr-1800(00). 1 Nov 60, 68p. 48 refs. ARF 1066-5; AD-246 613.

DESCRIPTORS: *Semiconductors, Electrical properties, Photoconductivity, Crystals, Electron transitions, Electron capture, Cadmium compounds, Sulfides, *Noise (Radio), Measurement.

Experimental current noise measurements are used to investigate electron trapping transitions in photoconductors. The results locate discrete traps in single crystal cadmium sulfide at 0.36, 0.41 and 0.43 electron volts below the conduction band. Trap escape frequency factors are determined under both 5200A and 4400A radiation and at temperatures of 10, 27, and 52 degrees C. The magnitude of the current noise is proportional to the average number of times an electron is trapped before recombination, which varies from 10 to 1000 for various conditions and different specimens. Using 4400A radiation, the ambipolar diffusion length is found to be 30 microns and the characteristics of traps in a surface region of this thickness can be examined. The energy location and other properties of these traps are similar to those in the bulk but there appears to be more traps in the surface region. Previously reported exponential distributions of bulk trapping states are found to be in error and experimentally observed 1/f trapping noise is shown to be associated with discrete traps. Contact noise as such is negligible in these specimens but the quality of the contact may exert a strong influence on the noise spectra. (Author)

PB 158 025 $1.60

Cornell U., Ithaca, N. Y.
SOFT X-RAY PHOTON COUNTER STABILIZATION OF SOURCE, by D. H. Tomboulian. Technical rept. no. 4 on Contract Nonr-401(37). Nov 60, 15p. 4 refs. AD-250 512.

DESCRIPTORS: Photons, *X-rays, Stabilization, *Electron tubes, *Voltage regulators, *Current regulators, X-ray absorption analysis.

It was previously shown (Tech. rept. 2 and 3) that the precision of absorption measurements could be improved if fluctuations in the incident beam of radiation were reduced. The variations in the intensity of the incident beam arise primarily from instabilities in the target potential and current; this is based on the fact that photon flux depends directly on the number of bombarding electrons per second and on the target voltage V in accordance with the empirical relation (V/V sub 0-1) to the nth power when V is greater than V sub 0. The dependence given in this relation is valid for line sources, V sub 0, being the excitation potential of the line or emission band used. The exponent n is found to be in the neighborhood of 5/3. Schemes are adopted for regulating the x-ray tube current and potential. (Author)

Solid State Physics

PB 157 413 $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
LINEARIZATION IN VISCO-PLASTICITY, by William Prager. Technical rept. no. 64 on Contract Nonr-562(10). Sep 60, 13p. C11-64; AD-244 555.

DESCRIPTORS: *Solids, Stresses, Viscosity, *Plasticity, Deformation, Load distribution, Differential equations, Theory, Mathematical analysis.

The analysis of stresses in visco-plastic bodies is based on the model of the incompressible Bingham solid. When the stress is below a certain threshold, this solid is rigid. In the theory of perfectly plastic solids, the quadratic yield condition is often approximated by a piecewise linear yield condition to simplify the analysis of boundary value problems. An analogous linearization in the theory of visco-plastic solids is discussed. A typical boundary value problem is formulated, and the uniqueness of its solution is investigated. The bending of a circular sandwich plate is treated as an example. (Author)

PB 157 495 $5.60

California U., Los Angeles.
THE EFFECT OF THE ELASTIC INTERACTION ON THE RATE OF CLUSTER GROWTH, by George Sines, W. Grupen, and R. Kikuchi. Rept. on A Study of the Interactions Between Single Point Defects and Clusters of Point Defects in Metals and Their Effect on the Rate of Precipitation, Contract DA 04-495-ORD-1250. Feb 61, 54p. 11 refs. Dept. of Engineering rept. no. 61-11; AROD rept. no. 2064.2-Met; AD-253 780.

DESCRIPTORS: *Solids, *Diffusion, *Metals, *Elasticity, *Crystal structure, Atoms, Lattices, Mathematical analysis, Growth, Metallic crystals, Thermodynamics, Numerical analysis, Digital computers, Differential equations.

In the study of the elastic interaction of the rate of cluster growth, the concentration of the point defects was assumed to be low enough to make the effect of changes in concentration on diffusivity negligible. The concentration of defects is assumed to be supersaturated to the extent that when a point defect attaches itself to a cluster there is a negligible probability of its leaving. The diffusivity and the elastic constants for the medium are assumed to be isotropic. Numerical computation was used to obtain the solutions for the edge dislocation with simple diffusion and with diffusion in the presence of an energy. The numerical solution was made by FORTRAN programming of an IBM 709 digital computer. Numerical analysis was used to obtain, for a realistic core boundary, the solution for the diffusion to a disk from the combined effect of the interaction energy and the concentration gradient. (Author)

PB 154 260 $3.60

General Electric Research Lab., Schenectady, N. Y.
RESEARCH ON DISPERSION HARDENING, by R. W. Guard. Rept. on Solid State Research and Properties of Matter, Contract AF 33(616)6406. Oct 60, 34p. 12 refs. ARL Technical rept. 60-288; AD-249 695.

DESCRIPTORS: *Alloys, *Hardening, Nickel alloys, Aluminum alloys, Titanium alloys, Aluminum compounds, Titanium compounds, Dispersion hardening, Oxides, Single crystals, Electron microscopy, Intermetallic compounds, Oxidation, Deformation, Interferometers, Stresses, Temperature.

The observations indicate that the slip bands formed in nickel are the result of much cross slip and suggest that particles interfere with the long-range motion of loops and thereby reduce the amount of cross slip. No evidence of the nature of the mode of slip line-particle interaction was obtained. Studies of the temperature dependence of the flow stress in single-phase and two-phase alloys give indirect evidence that thermally activated slip processes are greatly reduced by the presence of particles. The effect of particles on recovery is not clear. While the temperature at which the first evidence of recovery of strain hardening is observed is increased by the presence of a second phase, the later stages are affected in a somewhat confusing fashion. (Author)

PB 181 044 $1.50

Honeywell Research Center, Hopkins, Minn.
THE STRENGTH OF IONIC SOLIDS, by T. L. Johnston, C. H. Li, and R. J. Stokes. Technical rept. no. 10 on Contract Nonr-2456(00). Nov 60, 51p. 46 refs. Rept no. HR-60-558; AD-248 957.

DESCRIPTORS: (*Solids, Crystals, Stresses, Microstructure, Mechanical properties, Fracture (Mechanics), Deformation)

The strength of ionic solids is discussed in terms of their resistance to fracture. Particular emphasis is given to their extraordinary notch sensitivity. Ionic single crystals can exhibit considerable ductility before fracture providing the strain rate is low enough and the temperature high enough. However, the mere exhibition of ductillity can be misleading for such crystals may remain brittle in the presence of a notch. Notches can be formed in a variety of ways; by mechanical contact, by the interaction of slip dislocations with coherent surface deposits, with other slip dislocations or with grain boundaries. Only when substantial plastic flow occurs at the root of the notch can catastrophic cleavage be prevented. The amount of plastic flow depends upon the fundamental plasticity of the solid, the temperature, and the stress state at the crack tip. Grain boundaries invariably embrittle ionic solids in the temperature range in which a single crystal is notch sensitive. This is due to the inherently low cohesive strength of a grain boundary, which ruptures to form a notch (the size of which depends on the grain size) under the constraint stresses developed by limited plastic deformation. At temperatures in excess of 0.5 Tm grain boundaries have extremely low shear strength causing polycrystalline material to fail even at high strain rates. (Author)

TID-12881 $5.60

Sandia Corp., Albuquerque, N. Mex.
A STUDY OF DRIFT MOBILITY IN NEUTRON IRRADIATED n-TYPE GERMANIUM, by William H. Closser. June 61, 59p. SCDC-2313.

PB 154 330 $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
SOLID STATE RESEARCH FOR THE ADVANCEMENT OF ELECTRONIC MATERIALS, by J. A. Osborn, W. J. Carr, Jr., and P. A. Albert. Final technical rept. for 1 Mar 58-31 May 60 on Solid State Research and Property of Matter, Contract AF 33(616)5555. Dec 60, 27p. 11 refs. ARL Technical rept. 60-297; AD-250 992.

DESCRIPTORS: Measurement, Magnetic fields, *Magnetostriction, *Manganese alloys, Intermetallic compounds, Temperature, *Bismuth alloys.

This final summary report covers the results obtained in an investigation of the magnetostriction of manganese bismuthide at temperatures between 77 K and 298 K. Magnetization curves were also obtained on cylinders of MnBi both with the C-axis oriented along the cylinder axis and perpendicular to it. The magnetization curves, as well as three torque measurements were used to deduce values of the anisotropy constants. No direct similarity was found between the temperature dependence of magnetostriction and that of anisotropy. Thus no conclusions are possible on the origin of these effects. The results of low temperature torque measurements have indicated that two anisotropy contants were not adequate in describing the torque curves, and that a three constant expression was necessary. (Author)

Thermodynamics

NAA-SR-Memo-6576 $1.60

Atomics International, Canoga Park, Calif.
ANALYSIS OF TURBULENCE INDUCED VIBRATIONS OF TUBULAR IMMERSION HEATERS, by J. S. McDonald. June 61, 13p.

NAA-SR-Memo-6433 $1.60

Atomics International, Canoga Park, Calif.
GENERALIZED CURVES FOR RADIATION AND FREE CONVECTION HEAT TRANSFER WITH AIR, by C. J. Baroczy. May 61, 16p.

CUA-NE-14 $1.10

Catholic U. of America, Washington, D. C.
SIMULATED NUCLEAR REACTOR VIBRATIONAL HEAT TRANSFER. Quarterly progress rept. 1 Feb-30 Apr 61, on Contract AT(30-1)-2655. 10p.

TID-13203 $4.60

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 1, 1 Sep 59-31 Mar 60. 42p.

TID-13204 $1.10

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 2, 1 Apr-30 June 60. 7p.

AD-256 700 $28.50

Naval Ordnance Test Station, China Lake, Calif.
TEMPERATURE TABLES. PART 2. ONE-LAYER CYLINDRICAL SHELL, INTERNAL HEATING, ONE-SPACE VARIABLE, LINEAR, by C. J. Thorne and H. C. Morrin. 15 Mar 60, 690p. NAVORD rept. 5562, Part 2; NOTS TP 2511.

DESCRIPTORS: (*Cylindrical bodies, Structural shells, *Heat transfer, Mathematical analysis) (*Temperature, Tables), *Thermodynamics.

Temperature tables are calculated for one-layer cylindrical shells with constant inside recovery temperature and constant outside recovery temperature which is equal to the initial temperature in the shell. Temperature is a function of radial distance and time. The rate of heat transfer at both boundaries is assumed proportional to the temperature difference at the boundary. (Author) (See also PB 138 692)

Wave Propagation

UCRL-9613 $3.60

Lawrence Radiation, Lab., U. of California, Berkeley.
EXPERIMENTS ON ALFVEN-WAVE PROPAGATION, by J. M. Wilcox, Alan W. DeSilva and William S. Cooper, III. Rept. on Contract W-7405-eng-48. May 61, 35p.

PB 161 615 $1.50

National Bureau of Standards, Boulder, Colo.
MODE CALCULATIONS FOR VLF PROPAGATION IN THE EARTH-IONOSPHERE WAVEGUIDE, by Kenneth P. Spies and James R. Wait. 17 July 61, 104p. 19 refs. Technical note no. 114.

DESCRIPTORS: *Ionospheric propagation, Very low frequency, *Radio waves, Propagation, Reflection, Attenuation, *Waveguides, Numerical analysis, Frequency, Earth, Ionosphere, Wave transmission

Contents:
Calculations for a flat earth-ionosphere waveguide
Calculations for a spherical earth-ionoshpere waveguide using the Quasi-longitudinal approximation
Further calculations for a spherical earth-ionosphere waveguide
Table of inverse tangents of airy functions
Some formulae involving airy functions
A note on the conductivity of the lower ionosphere at VLF

PB 151 377-10 $1.50

National Bureau of Standards, Boulder, Colo.
QUARTERLY RADIO NOISE DATA; MARCH, APRIL, MAY 1961, by W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. 14 Aug 61, 67p. 11 refs. Technical note no. 18-10.

DESCRIPTORS: *Noise (Radio), Measurement, Tables.

See also PB 151 377-9

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 156 146 $1.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
TEST AND EVALUATION OF PRE-ACCIDENT RECORDING CAMERA, by Daniel L. Lorch. Rept. on TED NAM PH-1. 31 Mar 61, 13p. Rept. no. NAMC-ACEL-448, AD-254 889.

DESCRIPTORS: *Recording devices, *Wide field cameras, Cameras, Accidents, *Aviation accidents, *Instrument panels, Photographic analysis, Camera shutters, Tests, Design.

An inexpensive, one-shot, fixed focus camera was developed for the purpose of photographing an aircraft instrument panel immediately prior to ejection. This camera was evaluated for the determination of a typical mounting location, method of actuating the camera, and capability of adequately recording the instrument panel for post crash analysis. Results indicated that the camera, with some modifications, can be installed in jet type aircraft and satisfactorily operated with either a mechanical or electrical squib type system of actuation during ejection. (Author)

PB 158 681 $10.10

Lockheed Aircraft Corp., Burbank, Calif.
RESEARCH IN THE FIELD OF DEPOSITED STRAIN GAGES AND DEVELOPMENT OF A MINIATURE GAGE DEPOSITER, by Fred A. Singdale and Richard H. Seaman. Rept. 3 June 59-31 Jan 60, on Structural Testing of Flight Vehicles, Contract AF 33(616)6562. 20 July 60, 124p. 35 refs. WADD Technical rept. 60-712; AD-253 535.

DESCRIPTORS: *Strain gages, *Vacuum apparatus, Laboratory equipment, Transducers, Manufacturing methods, Production, Deposits, Operation, Maintenance.

Research deals with the application of past work performed in the field of vacuum deposited strain transducers on structural components, the development and application of deposited strain transducers, and contains a description of laboratory vacuum equipment developed, built, and utilized during this project. The development of a miniature gage depositor capable of operating from an a-c source and generating vacuums on the order of 10 to the 8th power mm Hg. is described. Patent No. 2,621,276, titled, "Electrical Strain Gage and Method of Making Same," by Dr. W. L. Howland and National Bureau of Standards Project 0602-10-3583 performed by A. Krinsky and R. Parker were investigated and the results of the investigation reported. Operating and maintenance instructions for the miniature depositor and the technique for depositing strain gages and insulation coatings have been included. (Author)

PB 157 191 $2.60

Rutgers State U., New Brunswick, N. J.
THE THEORY OF RECONNAISSANCE, by John M. Danskin. Final rept. on Mathematical Techniques of Aeromechanics, Contract AF 33(616)5318. Dec 60, 26p. 2 refs. ARL Technical rept. 60-337; AD-254 108.

DESCRIPTORS: (*Aerial reconnaissance, Theory, Surface targets, *Information theory, Guided missiles, Surface to surface, Launching sites, *Operations research, *Photographic intelligence, Military intelligence), (Games theory, Photographic analysis, Mathematical analysis).

A two-sided reconnaissance problem is given in which the side being reconnoitered seeks to minimize the information (maximize the confusion) obtained by the reconnoiterer, while maintaining at least a certain minimum acceptable threat with a fixed budget. This problem, formulated as a zero-sum, two-person game, is solved for one special case (fixed equipment) and it is proved that there exists a solution in mixed strategies for the general case. A model is given for evaluating the effectiveness of a photointerpreter by separating the confusion due to the photointerpreter from that due to the photographs. (Author)

SOCIAL SCIENCES

PB 157 626 $4.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ADVERTISING WITHOUT SUPPLY CONTROL: PRELIMINARY FINDINGS OF A STUDY OF THE DEMAND FOR ORANGES, by Marc Nerlove and Frederick V. Waugh. Technical rept. no. 90 on Contract Nonr-225(50). 27 Oct 60, 43p. 20 refs. AD-245 958.

DESCRIPTORS: Fruit, *Agriculture, Economics, Costs, Abundance, Distribution, Control, Statistical analysis, Mathematical analysis, *Commerce, Theory, Consumption.

The present paper is intended to supplement existing theoretical and statistical knowledge of advertising. In particular it is concerned with: (1) the theory of cooperative advertising; and (2) the quantitative effect of such advertising on demand. Following the theoretical analysis, a concrete example is presented in order to exhibit the possible effects of advertising by orange growers on demand and on potential uses of the type of analysis suggested. The theoretical analysis is static in nature and concerned with the economically optimal expenditure on advertising in the long run. When supplies are uncontrolled, the latter is found to depend on several factors: (1) the price elasticity of demand; (2) the long-run effects of advertising expenditures on demand; (3) the price elasticity of industry supply; (4) the nature and extent of external economies of diseconomies of scale to the industry; and (5) the rate of return on alternative forms of investment. Only the first two of these were quantitatively investigated in the present paper, but plausible assumptions concerning the magnitudes of the three last mentioned lead to results comparable to actual expenditures in recent years. (Author)

PB 158 072 $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON A TWO-SECTOR MODEL OF ECONOMIC GROWTH, by Hirofumi Uzawa. Technical rept. no. 93 on Contract Nonr-225(50). 28 Nov 60, 15p. 2 refs. AD-248 547.

DESCRIPTORS: (*Economics, Growth, Mathematical analysis)

The growth process in a two-sector model of capital accumulation and the stability problem of balanced growth equilibria under the neoclassical hypotheses was investigated. The competitive model of economic

growth is formulated in terms of the aggregate production function which specifies the relationship between output and factors of production. Output is assumed to be composed of homogeneous quantities identical with capital, or at least price ratios between output and capital are assumed constant. The economy consists of two types of goods, investment-goods and consumption-goods, to be produced by two factors of production, capital and labor; prices of investment-goods and consumption-goods are determined so as to satisfy the demand requirement. It is assumed that capital never depreciates, the rate of growth in labor is constant and exogenously determined, capitalists' income is solely spent on investment-goods, that of laborers on consumption-goods, and production is subject to the neoclassical conditions. Then a state of steady growth uniquely exists and the growth process, starting at an arbitrary capital and labor composition, approaches the steady growth, provided the consumption-goods sector is more capital-intensive than the investment-goods sector. An example of the two-sector growth model in which the steady growth process is not stable is presented. (Author)

PB 158 073 $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON THE STABILITY OF A COMPETITIVE BARTER PROCESS, by Hirofumi Uzawa. Technical rept. no. 94 on Contract Nonr-225(50). 30 Nov 60, 17p. 8 refs. AD-248 548.

DESCRIPTORS: (*Economics, Economic conditions, Stability, Mathematical analysis), (Supplies, *Scheduling).

Edgeworth's barter process consists of successive barters between individuals according to their preferences and budgetary restraints. At each stage of the barter process, each individual transacts whenever he becomes better off by trading; and, in the competitive case, the quantity of a commodity in exchange for the unit quantity of a standard commodity rises or falls according to whether or not the aggregate demand for that commodity exceeds the aggregate supply. The Edgeworth's barter process is shown to be always globally stable, provided the process has a positive solution starting with an arbitrary positive initial distribution. (Author)

PB 158 088 $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
THE STRUCTURE OF EFFICIENT CAPITAL ACCUMULATION IN THE TWO-GOOD ECONOMY, by Hirofumi Uzawa. Technical rept. no. 92 on Contract Nonr-225(50). 23 Nov 60, 24p. 8 refs. AD-248 054.

DESCRIPTORS: (*Economics, Economic conditions, Mathematical analysis, Calculus of variations), (Supplies, *Scheduling).

The two-good economy in which production processes are subject to neoclassical conditions is analyzed. The behavior of competitive capital accumulation in terms of those concepts that are familiar in formal economic analysis is studied. In each time period, referred to as a year, the quantities of two goods existing at the beginning are possibly transformed into various combinations of quantities at the year through technological processes available to the economy. The assumption is made that production is subject to constant returns to scale, marginal rates of transformation are always positive and diminishing, each good is produced separately, and there is no exogeneous consumption. (Author)

PB 157 482 $3.60

Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.
EXTERNALITIES, WELFARE, AND THE THEORY OF GAMES, by Otto Davis and Andrew Whinston. ONR Research memo. no. 74 on Planning and Control of Industrial Operations, Contract Nonr-760(01). Oct 60, 33p. 28 refs; AD-246 888.

DESCRIPTORS: (*Economic conditions, Statistical analysis, *Games theory, Economics.)

Portions of this report will not reproduce well.

If firms create external economies and diseconomies, the proper role of a welfare-maximizing government is to constrain the behavior of firms by arranging rates of taxes and subsidies in order to equate private with social benefit. Two main points are developed: (1) an argument is presented that motivation exists for firms themselves to try to eliminate externalities in production through merger, and (2) an attempt is made to show that the tax-subsidy scheme need not give the expected optimal welfare solution. (Author)

AD-260 734 $6.60

Case Inst. of Tech., Cleveland, Ohio.
MEASUREMENT OF VALUE OF RECORDED SCIENTIFIC INFORMATION. Final rept. 12 July 61, 69p. 4 refs.

DESCRIPTORS: *Scientific research, Measurement, *Information theory, *Scientific reports, *Indexes, Analysis, Classification, Identification, Library science, Documentation.

This exploratory study was directed towards determining the feasibility of developing measures of the value of a unit of scientific information. As part of the study, a survey of some of the implicit and explicit measures in use was made. We performed experiments in an attempt to objectively evaluate citation counts as an index of value of scientific articles. On the basis of these experiments we concluded that the usefulness of citation counts is open to serious doubts. We attempted to develop an improved measure of the value of a scientific document by providing a conceptual and metrical foundation for a behavioral theory of human communication based on the work of Ackoff (published in 1958). Controlled experiments were performed which attempt to determine the feasibility of applying a version of this theory to the evaluation of a given message. Possible applications of the theory in evaluating scientific articles are discussed. (Author)

PB 157 361 $1.60

Columbia U. School of Engineering, New York.
ON OPTIMAL SURVEILLANCE SCHEDULES, by Cyrus Derman. Technical rept. no. 12 on Contract Nonr-266(55). 1 Nov 60, 11p. 1 ref. AD-245 785.

DESCRIPTORS: (Supplies, *Scheduling), (Reliability, Probability, Mathematical analysis).

A surveillance scheduling problem is treated for which it is assumed that the unit remains in service (storage) until a failure is detected by an inspection (assume that a failure is detected with probability p), or it reaches some stipulated time T in service. Any knowledge concerning the distribution function of the life of the unit is not assumed. The schedule which minimizes the maximum possible expected cost associated with the inspections and failure of the unit is derived. (Author)

MISCELLANEOUS

PB 171 324 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Nov 61.

DESCRIPTORS: *Naval research, *Scientific research, Impedance, Sound, Intensity, Oceans, Detection, Moisture, Epoxy resins, Glass, Chemistry, Adhesion, Lead, Calcium, Propellants, Oxygen, Production, Algae, Culture, Electricity, Diodes, Mechanics, Palladium, Phase studies, Metallurgy, Ceramic materials, X-ray diffraction analysis, Crystallization, Fatigue, Hall effect, Semiconductors, Liquid metals, Neutron flux density, Barium compounds, Titanates, Nuclear physics, Acoustics, Spin, Magnets, Radio, Frequency shift keyers, Computers, Buoys, Submarine rescue chambers, Coaxial cables, Heat transfer, Microwaves, Propagation, Pacific Ocean, Solid state physics, Neutrons, Lithium, Radioactive isotopes, Scintillation counters, Transducers, Valves, Patents

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Nuclear and Atomic Physics: Acoustic spin wave branches of a class of ferrimagnets
Radio: Computer program for calculating amplitude of components forming the spectrum of a frequency-shift-keyed teleprinter. Submarine-rescue vhf/uhf radio transmitting buoy-mechanical design considerations. Method of improving the heat transfer in rigid coaxial lines. Microwave propagation measurements over the Pacific Ocean, 1946
Solid State Physics: An improved Li^6 loaded glass scintillator for neutron detection
Sound: On the radiation impedance of underwater cavity-type squirting transducers. Mechanical impedance added to the walls of a cavity resonator by the inside and outside liquid medium
Supporting Techniques: Improved Vacuum Vane Valves

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Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

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- Establishing a new business

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- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

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